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JULY/AUGUST 2015

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FOR PHOTOGRAPHY ENT

STEPHANIE GILMORE

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SHOWS OFF HER
CAMERA MOVES

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BEST TEENAGE
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The main photograph on this issue's front cover is of reigning women's surfing world champion, Stephanie Gilmore, taken by professional photographer Marcus Bell. But Steph is also an enthusiastic photographer as you'll read in our profile which begins on page 16.

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It's All About The Camera

MY ENGLISH PHOTO magazine colleagues in TIPA tell me that letters from readers – or, these days, emails – are a very regular occurrence after the publication of a new issue. Everybody has an opinion. One of my favourite UK classic car magazines has a 'Pedant Of The Month' column in which readers helpfully point out errors, however minor, in articles... it must be something to do with those long, cold winter nights.

However, this isn't the Australian way. Of course we make mistakes (on rare occasions), but our readers tend to spot them, note them and leave it at that. So, when we suddenly get a deluge – well, a heavy shower at least – of emails about a particular issue, then we know it has to be something pretty important. And that's what happened after my editorial in the last issue when I wrote about the manipulation of images (primarily in Photoshop) getting out of hand. My piece was prompted by renowned landscape photographer Ken Duncan's decision to instigate a competition for what he terms "photo realism", which means images primarily created in-camera with minimal post-production in the computer. Ken's particular concern is that overly manipulated images (he calls it "photo illustration") are winning major awards and, in the process, are being passed off as records of reality. I'm with him on this and so, it seems, are many of you.

One reader, Al Green, observed that if we think things are bad in landscape photography, it's nothing to what's happening in portraiture where heavy retouching is now the norm.

"I've started to embrace imperfection," he told me in an email. "Model's skin remains un-retouched and the use of available lighting has brought surprises that add magic and enhance. No more perfectly lit mannequins for me."

You can see some of Al's explorations of this fresh approach at <http://www.xperience-media.com/html/exhibit.html>

As I've noted on a few occasions here, the pursuit of perfection in landscape photography is totally baffling. A landscape is what it is... with either nature's many imperfections or the influences and interventions of man. The challenge for the photographer is to work with what's in front of the camera, using all the tools that are available in-camera along with the skills of framing, composition and the like. If you want to change stuff, go right ahead, but don't call the end result a photograph, because it isn't.

So let's define what we're on about here. As in the past with a darkroom, Photoshop is fine for dealing with the technical deficiencies

of the recording medium... so tools like Levels, Curves, Brightness/Contrast, Colour Balance, etc., are perfectly legitimate. It's when elements are subtracted or added that a line is crossed. So-called 'problem skies' are often cited as an issue, but frankly, if you're a competent photographer you should know how to deal with that in the field... with, for example, an ND filter or a polariser. As a photographer – and the word photography is derived from the Greek photos, meaning 'light', and graphos meaning 'drawing' – your principle tool is the camera. The ability to use a camera skilfully and creatively is what separates the photographer from any other sort of visual artist... including somebody who is a whizz on the computer with image editing software. The camera is what makes photography unique. And it's all those important decisions that go into the taking of a photograph – such as the choice of lens focal length, the filter (on lens, of course), the exposure settings and even the viewpoint – that constitute the fundamental art of photography. The 'fix it in Photoshop' mentality has not only served to diminish the real value of these creative thought processes and how they're subsequently realised in technical terms, but has diminished the perceptions of their importance, so there's a carelessness and casualness at the capture stage which, frankly, nothing can remedy later on.

But what you're also missing out on is the sheer enjoyment of camera work... the exquisite challenge of making a time and a place work in photographic terms, and which is even more rewarding if you've made a considerable effort to be there (like getting up at 4.00 am when it's minus five degrees Celsius outside). And, besides, surely being on location with a camera beats sitting in front of a computer at home every time, doesn't it?

And, by the way, I'm not advocating a return to film or even a 'sackcloth and ashes' depravation of automatic camera controls, because there are lots of digital-era functions that are truly useful... not the least being the immediate feedback on the monitor screen. However, the key is still understanding what these functions can and cannot do, so you can use them the most effectively.

Photography is ultimately all about the picture. But before this it has to be all about the camera. Amen.

Paul Burrows

Paul Burrows, Editor

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If you're in the market for a new interchangeable lens camera, our checklists will help you compare and contrast models in your price range. Where RRP's are no longer being provided, we're quoting an average of the 'street prices' we've seen quoted over the last few weeks. It's an imprecise science so expect to encounter some variations when you go shopping.

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It's perhaps one of NSW's best-kept secrets, but just west of the Blue Mountains is an even

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ON TRIAL

50 On Trial – Nikon D7200

There's no stopping Nikon at the moment when it comes to D-SLRs, and the new D7200 ensures fans of its 'DX' format actually have all the latest features and capabilities, both for still photography and shooting video.





FUJIFILM UNVEILS LOWER-PRICED X-T

NO DOUBT BUOYED by the huge success of its X-T1 mirrorless camera, Fujifilm has introduced a "little brother" model called the X-T10. It has the same 16.7 megapixels 'X-Trans CMOS II' sensor and 'EXR Processor II' as the X-T1, but a smaller and lighter magnesium alloy bodyshell, a smaller EVF and a lower-res LCD monitor screen. If anything, the X-T10's design is even more retro with Fujifilm referencing the 1970s-vintage Fujica ST801 35mm SLR as a source of the main styling cues. However, unlike the X-T1, the X-T10's bodyshell isn't sealed against the intrusion of moisture or dust.



The control layout is still mainly dial-based, but an important difference is the provision of a lever which engages fully automatic exposure control in one hit (i.e. instead of turning the shutter speed dial and lens aperture collar to their 'A' settings). Fujifilm says it is targeting the X-T10 at a younger audience capitalising on the growing interest in all things retro, but in reality

this is a consumer-level version of the primarily pro-level X-T1. It's priced at \$1299 with the 16-50mm f3.5-5.6 XC zoom lens or \$1499 with the 18-55mm f2.8-4.0 XF zoom.

Fujifilm has also introduced its latest X Series interchangeable lens, the 16mm f1.4 fast prime wide-angle. This model is also the latest addition to the WR line-up of weather-protected lenses for use with X-T1 and has a total of nine seals as well as a barrel design that enables operation in temperatures down to -10 degrees Celsius. The effective focal length is 24mm and the optical construction comprises 13 elements in 11 groups. Two elements are aspherical types to correct for distortion and two are made from extra-low dispersion glass to minimise chromatic aberrations. The new 16mm f1.4 also features Fujifilm's HT-EBC multi-coating to reduce ghosting and flare. It has a 'floating' focusing design which employs two groups of focusing elements to maintain optimum image quality across the focusing range. The minimum focusing distance is 15 centimetres.

The XF 16mm f1.4 R is the fourth WR lens, joining the XF 18-135mm f3.5-5.6 R OIS WR, XF 16-55mm f2.8 R OIS WR and XF 50-140mm f2.8 R OIS WR. Fujifilm says it will have a total of 21 X-Mount lenses (plus a 1.4x teleconverter) available by the end of 2015, including the XF 100-400mm telezoom (equivalent to 200-600mm) and the 120mm f2.8 macro.

For more information about the Fujifilm X Series cameras and X Mount lenses visit www.fujifilm.com.au

AUTOFOCUS UPGRADE FOR FUJIFILM'S X-T1

FUJIFILM HAS BEEN diligent with its firmware upgrades for the X Series cameras, including no fewer than 14 for the X-Pro1... exactly what should happen to keep a model as current as possible. Now Fujifilm has introduced perhaps one of the most significant firmware upgrades ever – this time for the X-T1 – and it gives the camera's AF system a significant overhaul.

Firmware Version 4.0 for the X-T1 adds a 'Zone' mode to the single-shot and continuous AF operations, and also a 'Wide' mode for the latter. The 'Zone' mode allows for the selection of clusters of focusing points – 3x3, 5x3 or 5x5 – for enhanced tracking with smaller-sized moving subjects and when panning. The 'Wide' mode enables tracking of a subject across the camera's full 77 focusing points with any direction of movement, including closing in or moving away. The phase-detection pixels have improved detection of tonal differences, now just 0.5 EV compared to 2.5 EV previously. The single AF points are divided into smaller sections for more precise determinations of a subject's distance. Eye-detection is added along with an auto macro mode which eliminates the need to be manually activated via the camera's Macro button. As a result, this control can be assigned to another function. The algorithms for AF operation when shooting video have also been refined, enabling smoother adjustments.

Firmware Version 4.0 also provides a couple of improvements to the X-T1's exposure control, namely that the compensation dial can now be used to make exposure adjustments when using Auto ISO, and the 'T' setting on the main mode dial allows for the full range of shutter speeds – from 30 seconds to 1/32,000 second – can be selected via the input wheel (with hybrid focal plane/sensor shutter operation).

The latest firmware upgrade for the X-T1 will be available for free download from the end of June. For more information visit www.fujifilm.com.au

BRIEF EXPOSURES

Olympus has introduced firmware updates for its E-M1 and E-M5 Mark II OM-D mirrorless cameras. Version 3.1 for the E-M1 and Version 1.2 for the E-M5 II add a unified underwater 'Picture Mode' preset (replacing

the previous and separate Wide and Macro options) which allows for adjustment of apertures and shutter speeds in the PASM modes. Additionally, the E-M1's upgrade provides an "LV Boost II" setting to the live view

capabilities for improved visibility using either the EVF or the monitor screen for night sky or starscape photography. The E-M5 II already has this feature. For more information visit www.olympus.com.au



BEHIND EVERY POWERFUL IMAGE IS A POWERFUL STORY

The Canon Light Awards is a programme of challenges created and judged by photographers. Be inspired, challenge yourself, improve your skills and become better storytellers through photography. Winners receive feedback from our Masters, plus there are over \$150,000 in prizes to be won. See the latest brief and submit your entry at www.canon.com.au/lightawards

Photo: Darren Jew, Canon Master

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PANASONIC GETS IN ON THE ACTION

SMALL VIDEO CAMERAS are big business at the moment and Panasonic is the latest to join the actioncam market that's been popularised by GoPro.

The Panasonic HX-A1 is a 'lipstick' style camera with a fully weatherised body so it doesn't require an extra housing. It can also operate in temperatures down to -10 degrees Celsius. The HX-A1 weighs just 45 grams and Panasonic has created a wide selection of mounting options for helmets (or heads), bicycle handlebars, straps, flat surfaces and tripods. There's also an adaptor for using GoPro accessories.

Available in either black or orange, the HX-A1 shoots Full HD video footage at 30

fps (using MPEG 4 AVC/H.264 compression) with the option of shooting at 720p and 60 fps. The built-in battery is good for 75 minutes, but an optional, screw-on battery extends the recording time to two hours and 45 minutes.

The 2.6mm focal length lens gives an angle-of-view of 150 degrees (there's also a Standard mode with a 120-degree angle-of-view) and the minimum focusing distance is 30 centimetres. There's a TTL white balance control and adjustable shutter speeds from 1/30 to 1/12,000 second. Movie clips are stored on a microSD memory card (now available with capacities of up to 128 GB).

A novel feature is the HX-A1's 'Night Vision' mode. The standard lens cover is replaced by an infrared type so subjects illuminated by an IR light source can subsequently be recorded even though they're in total darkness. Other features include a built-in WiFi module (allowing for remote control via a smartphone or tablet, as well as scene monitoring), a mono microphone (with a wind-cut filter), a USB terminal and interval recording.

The Panasonic HX-A1 is priced at \$299 which includes a Multi Mount, a Tripod Mount and the adapter for GoPro accessories. **For more information visit www.panasonic.com.au**



HELIOPAN FILTERS LAND IN AUSTRALIA

IF YOU LIKE to see the words 'Made In Germany' stamped on your photo gear, then you'll be pleased to know that Heliopan filters are now distributed directly in Australia.

The Heliopan range is extensive and new distributor Mainline Photographics is stocking the filters in all popular screwthread diameter sizes from 39 mm to 82 mm. Heliopan's filters for digital photography include UV, skylight (1A), polarising and neutral density (ND) types. The ND filters are available from 0.3 with a 2x filter factor to 4.0 with a filter factor of 10,000 (or -13 stops). These ND filters are made from colour neutral Schott glass which is designed to minimise any colour casts.

For more information about Heliopan filters (or to purchase online) visit www.mainlinephoto.com.au or call (02) 9437 5800. Mainline Photographics is also the Australian distributor for Voigtlander, Novoflex, Sirui, Artisan & Artist, UniqBall and Sunway Foto.



The Heliopan filters are available in all popular screwthread sizes from 39 mm to 82 mm.

TIPA READER SURVEY PRIZE DRAW WINNERS

The prize draw for the participants in the last TIPA Readership Survey was held on 29 May 2015 in presence of a notary in Madrid. The winners are:

- 1. PiX, South Africa** – Mike McWatts, Cape Town – Nikon D4S.
- 2. Pí, Netherlands** – Klaas Elzes, Groningen – Canon EOS 70D.
- 3. FHOX, Brazil** – Vinícius dos Santos da Silva, São Paulo – Nikon D3300.
- 4. Fotografia, Italy** – Daniele Torri, Bergamo – Sony Alpha 7R.
- 5. Photo Life, Canada** – Robert King, Brockville – Fujifilm X-T1.
- 6. Camera, Australia** – Colin Frederik, New South Wales – Olympus OM-D E-M10.

Once again, thank-you to all Camera readers who took time to complete the survey. Your feedback is immensely valuable.

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The K3 II carries many of its predecessor's technologies while adding many important ones of its own.

PENTAX DEBUTS PIXEL SHIFT ON 'APS-C' D-SLR FLAGSHIP

WHILE THE PROMISED full-35mm format Pentax D-SLR is still to come, parent company Ricoh Imaging has launched an updated version of the K-3 'APS-C' format D-SLR flagship. While the K3 II carries over a lot from the previous model – sensor, processor, AF system, metering, dual memory card slots and pentaprism-based optical viewfinder – it also sports a number of important new features.

For starters, the sensor-based image stabilisation system has been significantly upgraded and now gives a claimed 4.5 stops of correction for camera shake. As on the Olympus OM-D E-M5 Mark II, Pentax is using the enhanced precision of the new IS system to drive a pixel shift function whereby the sensor is fractionally moved as multiple exposures are made. However, unlike the Olympus, Pentax isn't using the function to boost resolution, but rather to record full colour information at each pixel location, thereby eliminating colour moiré effects and interpolation artefacts while improving both the sharpness and colour fidelity. To achieve this, the K3 II's 'Pixel Shift Resolution' function records four exposures with the sensor shifted by one pixel up, down, left and right (unlike the E-M5 II which takes eight exposures, the additional four made with half-pixel shifts to give an increase in resolution). As with the Olympus though, there's still the requirement for both the camera and the subject to be completely static during the process. Ricoh is also using the K3 II's image stabilisation system to deliver another interesting new feature. The new camera loses a built-in flash because this space is now used to

accommodate a GPS receiver, and there's also an electronic compass built-in. Along with the camera's orientation sensors, these components drive a feature called 'Autotracer' which is designed for use with astrophotography and shifts the sensor during long exposures so that stars are essentially 'tracked' in-camera. This ensures they're recorded as pinpoints of light and aren't rendered as trails as would normally happen even with comparative short exposures. Clever or what?

Apart from the changes to the pentaprism profile, the K3 II has essentially the same compact and fully weather-sealed magnesium alloy bodyshell over a stainless steel chassis as its predecessor. As noted at the outset, it also retains the same 24.7 megapixel CMOS sensor (24.35 MP effective), 'PRIME III' image processor, 27-point 'SAFOX 11' AF module, 86,000 pixels RGB metering sensor, 8.3 fps continuous shooting speed and ISO 100-51,200 sensitivity range. The dual card slots are for SD format devices. Also carried over – and again derived from the sensor-based image stabiliser – is the 'AA Filter Simulator' function which corrects for moiré patterns via sub-pixel shifting. The system has three settings – 'Off' which is obviously for prioritising resolution; 'Type 1' which is designed to balance resolution and moiré correction by shifting the sensor in a linear direction; and 'Type 2' which oscillates the sensor in a circular motion to optimise the blurring effect and moiré correction. Local availability and pricing for the Pentax K3 II have yet to be announced. Pentax and Ricoh products are distributed in Australia by C.R. Kennedy & Company. For more information visit www.pentax.com.au

NEW B&W LEICA M HAS LIVE VIEW AND VIDEO

LEICA HAS UPGRADED its B&W-only M Monochrom digital rangefinder camera to a new CMOS-type sensor which allows for both live view functions and Full HD video recording. The new Typ 246 model has a 24 megapixels full-35mm size CMOS sensor which, as before, doesn't have any RGB filters so records in monochrome. The sensor is matched with the same high-speed Leica Maestro image processor as is used in the current colour Typ 240 M. The sensitivity range is equivalent to ISO 320 to 25,000. The new Typ 246 also has an increased buffer memory capacity of two gigabytes and is capable of continuous shooting at up to 3.0 fps for a burst of 30 images. The camera uses SD format memory cards with support for the HC and XC types.

Also revised is the LCD monitor which is now a 7.62 cm TFT panel with a resolution of 921,600 dots. The live view screen allows for focus assistance via a magnified image (up to 10x) and a focus peaking display. The new M Monochrom records Full HD resolution video (in B&W, of course) at either 24 fps or 25 fps (PAL TV standard) in the Motion JPEG format. The camera's built-in microphone is mono, but an external stereo mic can be fitted and manual levels control is available. As before, still images can be captured as JPEGs (in one of four sizes) or as Adobe DNG RAW files (either uncompressed or losslessly compressed).

Beyond the digital elements, the new Typ 246 maintains all the classical elements of a Leica M RF camera. The top deck and baseplate are machined from solid brass blanks and finished in black chrome while the main body is made from magnesium alloy. The monitor screen has a scratch-resistant sapphire crystal cover and is treated with an anti-reflection coating. The optical viewfinder provides automatic parallax correction and has brightline frame pairs for the 35mm/135mm, 28mm/90mm, and 50mm/75mm lenses with the choice of red or white colours. It has magnification of 0.68x and a base length of 47.1 millimetres. There's the choice of centre-weighted average or spot metering plus, when in live view, multi-zone measurements. Exposure control is via aperture-priority auto or manual modes. The shutter speed range is 60-1/4000 second with flash sync up to 1/180 second.

The Leica M Monochrom (Typ 246) is available from Leica Boutiques and authorised dealers, priced at \$10,500 (body only). Leica products are distributed in Australia by Leica Camera Australia Pty Ltd, telephone (03) 9248 4444. For more information visit www.leica-camera.com



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GEE UP! NEW LUMIX G HAS 4K AND MORE

WITH BOTH PANASONIC and its Micro Four Thirds rival, Olympus, claiming top dog status in mirrorless cameras, what is clear is that the MFT format is definitely sticking it to everybody else in this category right now. It probably has something to do with the excellent lens choices, but there's also no doubt that both manufacturers are delivering cameras which deliver increasingly more capabilities and performance in ever-smaller packages.

The latest from Panasonic is the Lumix G7 which, like Fujifilm's new X-T10, also boasts a more classical styling, replacing the G6's curves with sharper lines and pronounced corners. Interestingly too, Panasonic is moving more towards a dial-based control layout and the G7 has a novel 'shift' arrangement which gives its external controls dual functionality. There's also now a total of 11 customisable 'Fn' buttons – both real and virtual – with the promise that the G7 can be flown without needing to go near its menu system. Manual operations are greatly improved and, consequently, the G7 is the most D-SLR like Lumix model to date.

Panasonic is now thoroughly committed to 4K video so the G7 gets a full suite of high-end features – very similar, in fact, to what's available on the flagship GH4 – and records 3840x2160 pixels resolution in the MP4 format at 25 fps (progressive scan), giving a data stream rate of 100 Mbps. Recording at 4K and 24 fps is also available while in the Full HD resolution, there's the option of using the AVCHD or MP4 formats. High-end video features include the 'Cinelike' D and V profiles, a zebra pattern generator, focus-peaking display and time-lapse recording, but it lacks the GH4's colour bars, audio tones or stereo audio output. The built-in microphones are stereo supplemented by a 3.5 mm stereo audio input,

The '4K Photo' mode introduced last year on the GH4 and LX100 models has been further refined to provide more ways of benefitting from the extracting of 8.3 megapixels JPEG still frames from 4K video footage. For starters, the '4K Photo' modes get their own position on the G7's drive mode dial from where is accessed three options. '4K Pre-Burst' captures 60 images

in two seconds (i.e. at 30 fps); 30 prior to shutter release and 30 after, the idea being that you'll never miss that 'decisive moment'. In '4K Burst' mode, the camera shoots at 30 fps for as long as the shutter button is held down for up to 29 minutes and 59 seconds. The third option – called '4K Burst S/S' – does the same except that it works like a 'T' setting so one press of the shutter button starts the recording and a second press stops it (S/S is short for Start/Stop). These '4K Photo' modes can be used with any exposure control mode and, with the latter two, there's a choice of aspect ratios, namely 4:3, 3:2, 16:9 and 1:1.

The G7 has a new 2.36 megadots OLED-type EVF and 1.04 megadots LCD monitor screen which has touch controls and is fully adjustable for tilt and swing. Also inherited from the GH4 is the 'DFD' (Depth From Defocus) contrast-detection autofocus system – which enables a response time of just 0.07 seconds – but a new control algorithm now uses the target's size and motion vector as well as its colour. Also new is a 'Starlight AF' mode which employs much smaller measuring points – so it can work with pinpoints like stars – and increased low-light sensitivity.

The G7 continues to use the same 16.84 megapixels 'Live MOS' sensor, but it's mated to the latest generation, quad-core 'Venus Engine 9' processor which enables, among other things, continuous shooting at 8.0 fps with the AF/AE locked to the first frame (6.5 fps with continuous AF). The sensitivity range is equivalent to ISO 200 to 25,600 with a one-stop 'pull' to ISO 100. The provision of a sensor shutter allows for a top speed of 1/16,000 second, but the G7 also retains a conventional focal plane shutter.

Perhaps the biggest deal about the new Lumix G7 is its price. The body alone sells for \$899 while adding the G Vario 14-42mm f3.5-5.6 ASPH Mega OIS 'kit' zoom comes in at a dollar under \$1000. A second kit option provides the G X Vario 14-140mm f3.5-5.6 ASPH Power OIS superzoom (equivalent to 28-280mm) and is priced at just \$1499. For more information visit www.panasonic.com.au

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PHOTOGRAPHY EXHIBITIONS & EVENTS

Current to 23 August: Exhibition. Crowd Source. Over 50 rare snapshots of Sydneysiders and Sydney's bustling streets secretly taken with the world's first hand-held camera – branded the 'Detective Camera' – by amateur local photographer Arthur Syer. At the State Library of NSW, Macquarie Street, Sydney, NSW 2000. Exhibition hours are 9.00am to 8.00pm Monday to Thursday, 9.00am to 5.00pm on Friday, and 10.00am to 5.00pm on weekends. Entry is free of charge. For more information call (02) 9273 1414 or visit www.sl.nsw.gov.au for more information.

Current to 23 August: Exhibition. The View From Here: The Photographic World Of Alfred Elliott 1890-1940. Historic images of Brisbane reproduced from a hoard of negatives discovered under a house in the suburb of Red Hill. At the Museum Of Brisbane, Level 3, Brisbane City Hall, 64 Adelaide Street, Brisbane, Queensland 4000. Exhibition hours are 10.00am to 5.00pm daily. Admission is free.

For more information telephone (07) 3339 0800 or visit the website www.museumofbrisbane.com.au

Current to 4 October: Exhibition. Remain In Light: Photography From The MCA Collections.

Over 70 artworks by Australian and international artists collected by the University of Sydney and the Museum of Contemporary Art during a period spanning more than 50 years. Touring exhibition on at the Maitland Regional Art Gallery until 1 February. Bendigo Art Gallery from 21 February to 19 April. Artspace Mackay from 22 May to 4 July. Hawkesbury Regional Gallery from 7 August to 4 October.

Current to 5 October: Exhibition. 2014 Wildlife Photographer Of The Year. A total of 100 images from the world's largest wildlife and natural history photo competition. At the Australian Museum, 6 College Street, Sydney, NSW 2010. Museum hours are 9.30am to 5.00pm daily. For more information visit www.australianmuseum.net.au

4 July – 11 October: Exhibition. The Photograph And Australia. Comprising 350 photographs from

over 35 lenders, this major exhibition reflects an evolving image of Australia from the 1840s onwards. At the Queensland Art Gallery, Stanley Place, Cultural Precinct, South Bank, Brisbane, Queensland 4101. Telephone (07) 3840 7303 for more information or visit www.qagoma.qld.gov.au Gallery hours are 10.00am to 5.00pm daily.

31 July – 2 August: New Tech '15. The latest technologies across imaging, audio, entertainment, automotive and more, all on show in one venue. At the Sydney Showground, Sydney Olympic Park, Homebush, NSW. For more information visit www.chestergroup.org/newtechsydney/2015

14 August – 25 October: Exhibition. Julia Margaret Cameron: From The Victoria & Albert Museum. Marking the 200th anniversary of the birth of the famous British portrait photographer with prints on loan from London's V&A. At the Art Gallery of NSW, Art Gallery Road, The Domain, NSW 2000. Telephone (02) 9225 1744 for more information or visit www.artgallery.nsw.gov.au Gallery hours are 10.00am to 5.00pm daily

(open to 9.00pm on Wednesdays).

16 – 18 October: The Digital Show 2015. All the latest imaging products and processes on show. Organised by the Image & Digital Entertainment Association (IDEA) Australia. At the Melbourne Convention & Exhibition Centre, Southbank, Melbourne, Victoria 3006. For more information visit www.thedigitalshow.com.au

20 November – 13 March 2016: Exhibition. Bailey's Stardust. A retrospective exhibition of photographs from London's National Portrait Gallery covering the long career of legendary fashion photographer David Bailey. At the National Portrait Gallery (NPG), King Edward Terrace, Parkes, ACT 2600. Gallery hours are 10.00am to 5.00pm daily. More info at www.portrait.gov.au or telephone (02) 6102 7000.

20 – 26 September 2016: 2016 Photokina World Of Imaging. The world's largest exhibition of new imaging products and processes. At the Köln Messe, Cologne, Germany. Visit www.photokina-cologne.com for more information.



MICRO FOURTHIRDS users already enjoy the most extensive choice of lenses in the mirrorless world and Olympus has now added a further two, delivering on the pair of PRO Series models announced last year.

Both the new M.Zuiko Digital ED 8.0mm f1.8 PRO and the M.Zuiko Digital ED 7-14mm f2.8 PRO replicate lenses that were in Olympus's FT D-SLR system and represent another reason for the remaining E-5 users to switch to the OM-D system. The M.Zuiko Digital ED 7-14mm f2.8 PRO – which has an effective focal range of 14-28mm – incorporates a complex 14-element optical construction including two DSA

('Dual Super Aspheric' which are doubled sided aspherical), one EDA (Extra-Low Dispersion Aspheric), two Super HR (Super High Refractive) and three Super ED types. Olympus says distortion is minimal across the full focal range. It has a minimum focusing distance of 7.5 centimetres and weighs 534 grams.

The M.Zuiko Digital ED 8.0mm f1.8 PRO is the world's fastest fish-eye lens and has an effective focal length of 16mm. It's a rectilinear design giving a full 180-degrees angle-of-view. The 17-element optical construction includes three Super ED, two ED, one aspherical,

OLYMPUS DELIVERS NEW PRO LENSES AND LIMITED EDITION E-M5 II

one Super HR and two HR types which are designed to minimise distortion and chromatic aberrations. The minimum focusing distance is just 2.5 centimetres. As per the earlier M.Zuiko PRO Series lenses, the new models are sealed against the intrusion of dust or moisture and also insulated to permit operation in temperatures down minus ten degrees Celsius. They also have Olympus's 'ZERO' multi-coating (Zuiko Extra-Low Reflectance Optical) which is applied to all lens surfaces to suppress ghosting and flare. Local availability will be from the end of June and prices have yet to be announced.



Olympus has also announced a limited edition version of the recently-released OM-D E-M5 Mark II with a titanium body colour. Only 7000 units will be built and the edition pays homage to the legendary OM-3Ti, the last of the 'serious' 35mm OM system SLRs. It had actual titanium top and bottom plates and remains highly sought after by collectors. The limited edition E-M5 II retains a magnesium alloy body, but Olympus says its titanium-look finish recreates the "unique colour" of the OM-3Ti. The camera is packaged with a bespoke strap and a special numbered card in a leather case which also includes an inspirational quote by Yoshihisa Maitani, the designer of the 35mm OM system. It's priced at \$1899 body only. If you want one, it's probably worth getting in quick. For more information visit www.olympus.com.au



The URSA Mini is half the weight of the existing Blackmagic URSA model and is claimed to be the world's smallest and lightest 'Super 35' format video camera for hand-held operation. It's available with either Blackmagic's new 4.6K sensor (for capture at 4608x2592 pixels) or the existing 4K device.

BLACKMAGIC GETS IN ON THE ACTION(CAM)

THE COMPETITION CONTINUES to hot up in the video 'actioncam' market and the latest arrival is Australia's own Blackmagic Design. Its ultra-compact Micro Cinema Camera is based on a 'Super 16mm' sensor and is specifically designed for applications such as being carried aloft on a drone.

A unique feature is the provision of an expansion port which enables the use of PWM or S.Bus model aircraft radio controllers to operate the camera wirelessly. The multiple channels of these controllers can be mapped to any camera or lens function – for example, focus, aperture, audio level

is the placing of its controls on the front for easier access once the camera is mounted, for example, on a helmet. Despite its small size, the MCC has an active Micro Four Thirds lens mount and its pro-level features include 12-bit RAW and ProRes recording, a switchable 60 fps rolling shutter or 30 fps global shutter, HDMI connector, 3.5 mm stereo audio input and an SD memory card slot.

Also new from Blackmagic Design is the URSA Mini, a compact and lightweight 'Super 35' format pro-level video camera available in a number of configurations, including with a new '4.6K' sensor which captures at 4608x2592 pixels and up to 60 fps. A dynamic range of 15 stops is available when shooting in the rolling shutter mode (13 in the global shutter mode).

The URSA Mini has dual CFast 2.0 memory card slots and supports open file formats such as CinemaDNG 12-bit RAW and ProRes 4444 XQ to 422 Proxy. It also features all standard connections, including dual XLR mic/line audio inputs with phantom power, a 12G-SDI output for monitoring with a camera status overlay, and 4-pin XLR power output for viewfinder power. Other features include sensor cooling (for optimising dynamic range), a 12.7 cm fold-out monitor with touchscreen controls and Full HD resolution, built-in stereo microphones, the choice of EF or PL lens mounts, and ¼-inch mounting points on the top and bottom of the camera for attaching accessories such as matte boxes or rails. The URSA Mini is also available with Blackmagic's existing 4K sensor.

Local pricing has yet to be announced, but in the USA the URSA Mini starts at US\$2995 (4K sensor/EF mount) while the Micro Cinema Camera will sell for US\$995. For more information visit www.blackmagicdesign.com



The new Blackmagic Design Micro Cinema Camera has an expansion port which allows for remote camera operations via an RC model aircraft controller (either PWM or S.Bus).

and record start/stop – which can then be operated remotely. The expansion connector include four PWM channels for all brands of model aircraft RF controllers while the single S.Bus connection can accommodate up to 18 channels of control. Another interesting aspect of the MCC's design





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ON A WAVE

STEPHANIE GILMORE

Six times world champion on the Women's ASP World Tour, Stephanie Gilmore has achieved a huge amount in her sporting career, but still manages to find time to pursue her passion for photography. She's now a Nikon Ambassador and *Camera* managed to catch up with her during a brief break in her busy competition schedule.

INTERVIEW BY PAUL BURROWS





STILL ONLY 27, Stephanie Gilmore already has a decade of professional surfing competition behind her. In that time she's won more than 20 elite world tour events and been crowned women's world champion on six occasions, including in 2007 which was her first full year on the tour. In recognition of her many achievements, Stephanie was awarded the Laureus World

Sports Award – considered the most prestigious award in action sports worldwide – in 2010 and the ESPN ESPY for Best Female Action Sports Athlete in both 2011 and 2013. Despite her demanding competition program, she still finds time for the two other great loves in her life, playing the guitar and photography.

"I have always been a visual person," Stephanie explains, "so

I've always preferred imagery over text. I got into photography around 2008 which was my second year of travelling the world for professional surfing. I started to buy cameras along my travels and shoot the awesome places I was visiting. I would always shoot with film because I had the time and it was an exciting feeling to have to wait and see what I captured. As the years have gone by, I'm so glad I've got images from all over my travels of the landscapes, my friends, random people and the fun times."

Not surprisingly given some of the stunning locations that she competes in around the world, travel photography is a favourite of Stephanie's, but she has other interests too.

"For sure, there have been many times in the surf when the waves are great, or the water is incredibly clear, or the sunset has made the waves really colourful, and I've really wished I've had a camera. But now I've got both a Nikon AW1 and a Coolpix AW100 which are waterproofed so I can thrash around in the surf and still capture what I'm seeing with my eyes."

The pro surfing scene attracts plenty of photographers both professionals and amateurs, but actually being part of the tour gives Stephanie a unique perspective.

"I do like to take images around events because I guess I have an intimate access, behind the scenes, to world-class athletes. There are many really

"The first camera that really helped me to fall in love with photography was a Hasselblad 501C that I bought second hand in Honolulu."

"Travel photography is definitely what I gravitate to, mainly because that's my lifestyle in general, but I really love to capture the dynamic moods of the ocean and waves. Mother Nature provides the most incredible subjects.

"Portraits are great fun too, especially of my friends and family, so I'm getting into that a little bit more."

Behind The Scenes

Of course, surfing big waves has produced some brilliant photography, so does she ever get distracted in a competition and think, 'I wish I had my camera with me'?

cool moments to capture, but then I definitely also like to give everyone their space, especially when they're competing... or if they're an opponent of mine. There are also so many photographers constantly snapping away around the events so not much goes unnoticed."

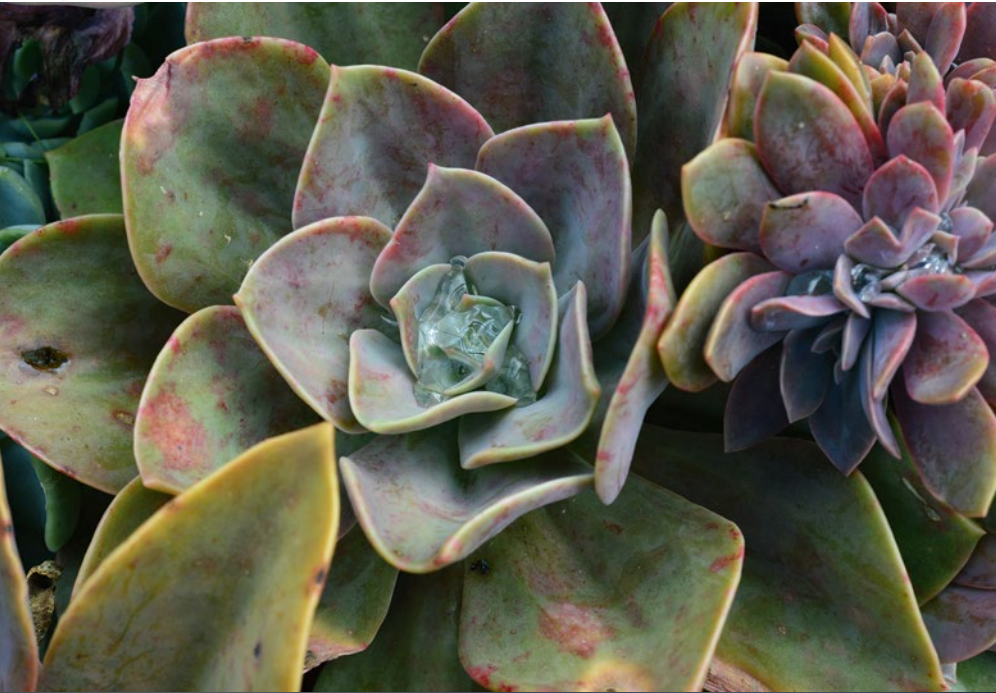
Traditional Tastes

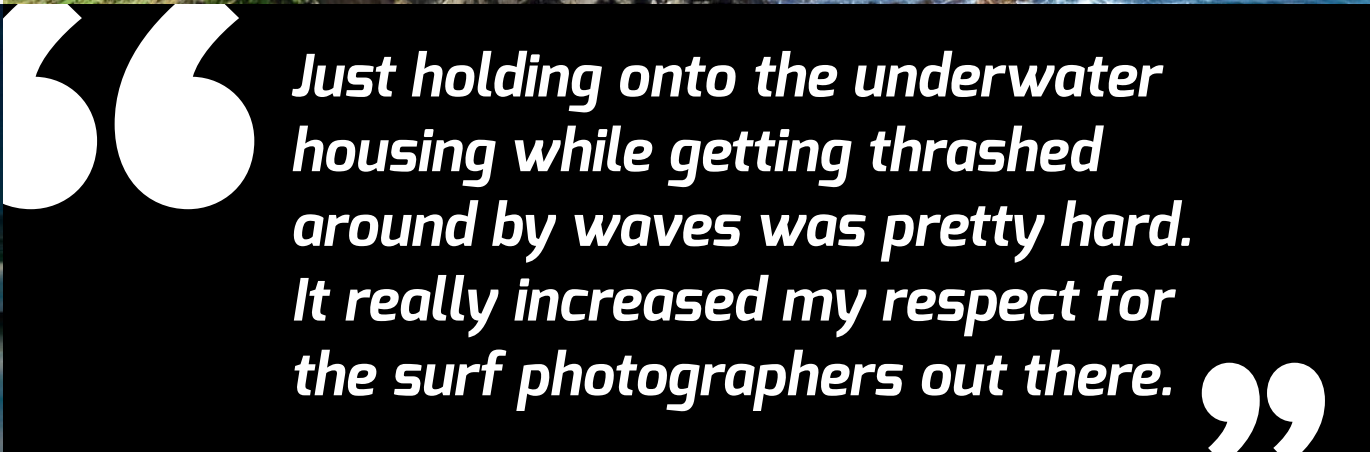
Interestingly, Stephanie's tastes in cameras are fairly traditional and she likes to be in control. She also still has an affection for film.

"The first camera that really helped me to fall in love with photography was a Hasselblad 501C that I bought second hand in Honolulu. Being fully manual,









Just holding onto the underwater housing while getting thrashed around by waves was pretty hard. It really increased my respect for the surf photographers out there.



exposure settings and how to use them. And the viewfinder was great for learning about framing and composition. Lately, I've really been enjoying using the Nikon Df for the same reasons... I don't use the automatic mode so I have to get all the exposure settings right."

As far as her ideal camera is concerned, she has an interesting and challenging design brief for Nikon's designers and engineers.

"I would love a D810 with the looks of a Df and, if it was completely waterproof, that would be the icing on the cake."

Talking of the Nikon D810 which also has fairly impressive video capabilities, we asked Stephanie if shooting video interests her, especially since the action of surfing really lends itself to this medium.

"I truly love motion picture," she says, "although I haven't shot much myself. But I've been seeing a lot of both amateur film-makers and professionals shooting really cool video stuff with D-SLRs so maybe I'll grab a D810 – as it seems to be the go-to camera for video at the moment – and see what I can come up with."

Best Shots

Perhaps not so surprisingly, Stephanie considers her best photographic experience so far

**“
I would always
shoot with film
because I had
the time and it
was an exciting
feeling to have
to wait and see
what I captured.**

to have been spending some time with Clark Little – renowned for his dramatic pictures of breaking waves – who is based in Hawaii (visit www.clarklittlephotography.com).

"Hanging with Clark was awesome," she enthuses. "He showed me a few of his tricks and we swam out into his 'office' which, of course, is similar to mine. It was cool to see him in action, getting pounded by giant shore break waves, swimming with sharks without a cage, trying to capture something both divine and unique. Just holding onto the underwater housing while getting thrashed around by waves was pretty hard. It really increased my respect for the surf photographers out there who are swimming in the

most dangerous surf breaks, capturing mind-blowing photos."

Stephanie lists a number of other photographers whose work she particularly likes.

"I really admire some of the photographers who I've worked with in the surf industry, including Morgan Maassen, Trent Mitchell and Jon Frank. I love the work of Dave LaChapelle and his crazy visions – that style of cinematic photography is cool. I also love how natural Ryan McGinley's work is, he's super talented. Then there's Bob Gruen because his photos are all so iconic and I just love the stories they tell."

So what else is on Stephanie Gilmore's photography 'bucket list'?

"I'd love to do a small exhibition one day, but there's so

much more to shoot before I can do that. Scandinavia is on my list of places to travel to... to surf, shoot and explore; as well as the Mediterranean."

While an exhibition of her photographs is in her long-term plans, there isn't much spare time at present to play around with making prints, even of her most favourite images.

"At the moment I'm mainly sharing my pictures online," Stephanie explains, "but I'm definitely hoping to print some of my images sometime soon. I love large image prints because they can really create a feeling in a room." 📷

To see more of what Stephanie Gilmore is doing visit www.stephgilmore.com



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50 Pentax Auto 110 (1978)



Contrary to popular belief, the 110 film format was pretty successful – much more so than the Disc format which followed – and it spawned some pretty interesting cameras, even at the snap-shot level. Kodak thought the format had enough potential for enthusiasts to manufacture Kodachrome in the size, and Pentax went as far as designing an SLR body with interchangeable lenses. Even in the digital era, the Pentax Auto 110 remains the world's smallest interchangeable-lens reflex camera... even smaller than Pentax's own pocket-sized CSC, the Q. The clever bit was the combined shutter/diaphragm mechanism located just inside the lens mount (on the body) which enabled truly tiny lenses... and, remember, these were still focused manually! The rise and rise of 35mm spelled the end for 110, but the Pentax Auto 110 remains an exemplary piece of camera design.

49 Ricoh XR-S (1981)



As cameras, including 35mm SLRs, became increasingly automated from the end of the 1970s, the demand on battery power led to the trying out of some ingenious – and ambitious – solutions. Ricoh came up with the idea of supplementing the camera battery with solar panels on either side of the pentaprism housing on the XR-S. Snag was, the photovoltaic panels of the day weren't particularly efficient and the two on the XR-S were pretty small as well. The claim was that the solar panels would keep the camera's battery recharged for five

years before it required replacement, but in reality the standard Battery-S gave up the ghost much earlier. Fortunately, the XR-S could be powered by a pair of standard 1.5 volt SR44/LR44 cells as well. Nevertheless, it still looks like a good idea. A neat touch was that the XR-S's camera case had a pair of 'sunroof' transparent panels in the top so the cells could continually receive light.

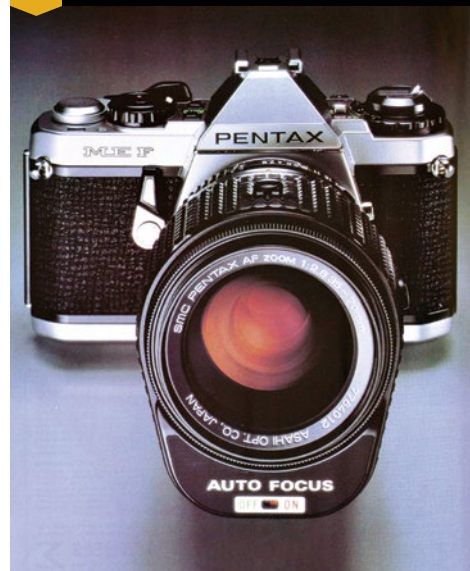
48 Mamiyaflex C Professional (1957)



The success of the Japanese camera industry was largely built on looking at what the Europeans were doing and making it better. It happened with the 35mm rangefinder camera, the 35mm SLR, the rollfilm reflex and, of course, the twin lens reflex. The TLR world was dominated by the Rolleiflexes in their many variations and varieties, but all had fixed lenses so there were separate wide-angle and telephoto models.

The genius of the Mamiyaflex C was simple – interchangeable lens modules. These comprised matched viewing and taking lenses mounted on a plate which was held in place on the front of the camera via a simple clamping system. Focusing was via a bellows arrangement and the lens system eventually spanned a 55mm wide-angle to a 250mm telephoto. Dual focusing knobs were added to later C2 model and, on the C3 (introduced in 1962), the film advance knob was replaced by a crank handle. Subsequently, the C evolved all the way through to 1983 and the C330S which featured a lighter weight aluminium body, dual shutter releases and a parallax correction indicator in the viewfinder.

47 Pentax ME-F (1981)



Pentax's compact M-series 35mm SLRs were the company's belated response to Olympus's game-changing OM-1 and OM-2 so the pressure was on to deliver some serious innovations. Consequently, the ME Super (1979) was the first 35mm SLR with push-button controls, albeit only a pair of them for the up/down selection of manual shutter speeds. Nevertheless, it wouldn't be long before everybody was doing it. More significantly, the ME-F added an electronic rangefinder which worked in conjunction with a motorised zoom lens to deliver autofocus (and provided focus assist with MF lenses). The contrast-detection AF system didn't work especially reliably and the 35-70mm lens was a bulky unit as it had to house four AAA-size batteries to drive the focusing motor. However, with the ME-F Pentax established the basic configuration for a passive AF system in an SLR which – with many refinements obviously – has been used ever since.

46 Minolta SR-T 101 (1966)



Revisiting Minolta classics is always a reminder that the brand is now sadly missing from today's scene (even if Sony is keeping up its tradition of producing interesting cameras). Minolta's history in 35mm SLRs is a rich one, starting with the SR-2 in 1958, but the real innovations began with the SR-T 101. This is the camera which

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made many photographers into loyal devotees of Minolta and it not only incorporated full-aperture TTL metering, but an advanced metering system called Contrast Light Compensation or CLC for short. CLC predates multi-zone metering by nearly two decades and employed two metering cells to separately measure the top and bottom parts of the frame in order to compensate for an extreme brightness range within a scene. The SR-T 101 also helped establish Minolta's reputation for making the best viewfinders in the business, and used an oversize reflex mirror to eliminate vignetting even with very long lenses. Doing so much so well, it stayed in production for close to a decade.

45 Minolta Hi-Matic 7 (1963)



During the 1960s the fixed-lens rangefinder camera represented the middle ground between the point-and-shoot models – such as the Kodak Instamatic which was launched in the same year as the Hi-Matic 7 – and the 35mm SLRs. Pretty much all the Japanese camera manufacturers were represented in this category, but the early Hi-Matics from Minolta were considered a cut above. An Ansco-badged version of the original 1962 Hi-Matic has the distinction of being the first camera in space. The later 7 had a faster Rokkor 45mm f1.8 lens, a more reliable CdS-type exposure meter and allowed for the manual control of apertures and shutter speeds. However, it also offered aperture-priority and shutter-priority auto modes... plus fully auto control, well before the term “multi-mode” had been coined in relation to 35mm SLRs. The subsequent 7S version added the CLC (Contrast Light Compensation) metering of the SR-T 101 and a flash hotshoe.

44 Olympus Pen F (1963)

The half-frame 35mm format burned brightly but briefly during the mid-to-late 1960s, adopted because it allowed for smaller cameras and doubled the ‘yield’ from a roll of film. Many manufacturers made half-frame cameras, but none enjoyed the success of Olympus's Pen-series; of which there were eventually 19 models of fixed-lens compacts and three SLRs. The latter were still exceptionally compact thanks to turning the reflex mirror on its side and employing an innovative rotary focal plane shutter (which enabled flash sync up to 1/500

second). The Pen FT (1966) is the pick of the litter as it incorporates a CdS-type exposure meter and a single-stroke film advance lever. The lens system eventually grew to 18, including two zooms (a 50-90mm and a 100-200mm), an 800mm mirror supertelephoto and a 38mm f2.8 ‘pancake’ prime. Of course, the Pen F's styling is the inspiration behind the current Digital Pen E-P1/2/3 compact system cameras.



The Olympus Pen F was the world's first 35mm half-frame SLR and employed a porro-prism arrangement for its reflex viewfinder. Shown here is the last-of-the-line FV model which was built between 1967 and 1972.

43 Hasselblad XPan (1998)



For reasons still not entirely clear, the 35mm rangefinder camera enjoyed a bit of a renaissance towards the close of the 20th century. Leica's M6 had been fighting a rearguard action for years, but was then joined by the Voigtlander Bessa M and R series, the Konica Hexar RF, the Zeiss Ikon, the Rollei 35 RF and Hasselblad's XPan. Leica replaced the M6 with two models, the purist MP and the aperture-priority auto M7. By 2005 it was as if the 35mm RF camera had never been away. However, the XPan is unique because it can be switched to a double-35mm format, giving a 24x65mm panorama frame. This necessitated lenses with a bigger image circle so an exclusive mount was necessary rather than the universal M-bayonet. Still, it's amazing how versatile the standard 45mm f4.0 standard lens really is (and it becomes equivalent to a 25mm in the panorama mode)... and there still isn't a digital equivalent.

42 Agfa Optima (1959)



Amid the claims and counter-claims as to who first came up with the world's first fully automatic 35mm camera, Agfa's Optima is often overlooked, but it has a legitimate claim to the title. Agfa subsequently used the Optima name on quite a variety of compact cameras (35mm, half-frame, 110 and Rapid... there was even a 35mm TLR), but it's the original that represents The Great Leap Forward for 1959. What's more, the Optima delivered programmed exposure control without requiring batteries. Instead, it used a mechanical system whereby the shutter speed and aperture settings were first obtained by pressing down on “The Magic Button” – actually a lever – linked to a selenium cell meter... then the shutter release was pressed. There were even red and green exposure indicators in the viewfinder, and the system favoured the fastest possible shutter speed – from a range of 1/30 to 1/250 second – to help avoid camera shake. Yes, it was 1959...

41 Canon ELPH/IXUS (1996)



Was there a bigger dud in the history of film than the Advanced Photo System? It was too little, too late and, virtually immediately after it was launched, key backer Kodak seemed to lose interest in it. Everybody soldiered on gamely for a while – there were even a couple of APS SLRs – but it was Canon's diminutive ELPH which really made the most of the format's attributes and conveniences. Consequently, at one stage Canon was selling more ELPHs than all the other APS compacts combined. The neat little stainless steel bodied camera was a hit regardless of gender, age and skill levels. It undoubtedly provided Canon with a good base of users ready to switch to the similarly-styled PowerShot Digital ELPH when it appeared four years later. The combination of compactness, capabilities and unfussy, but smart styling set the benchmark for the future.

40 Rollei 35 (1966)



Rollei's 35mm subcompact was an ingenious piece of packaging and survived in one version or another for nearly 35 years. Shown here is a special silver edition of the 35S which was available for a short time in the late 1970s.

Back in the 1960s miniaturisation relied on mechanical ingenuity and creating a camera as small as the Rollei 35 was no mean feat. Locating the film rewind crank and hotshoe on the baseplate and employing a collapsible lens enabled designer Heinz Waaske to make the Rollei 35 pocket-sized in an era before integrated circuits made this very much easier. The Japanese had already achieved some exceptionally small designs, but only by adopting the half-frame 35mm format, led by the Olympus Pen series.

With the lens collapsed, the Rollei 35's total depth is just 40 mm which may not be super slim by digital compact camera standards, but was pretty impressive for the mid-1960s.

This was a very long-lived model series (production eventually ended in 1999) with many variants, including numerous limited editions commemorating various anniversaries. The pinnacle was probably the 35S (1974) with a 40mm f2.8 Sonnar lens and which was revived in the 1990s as the Rollei 35 Classic.

39 Graflex Speed Graphic (1912)



The Speed Graphic was in production from 1912 to 1968 and there were numerous variants along the way. Shown here is the Miniature model - 2 1/4 x 3 1/4 inches format - which was introduced in 1938.

Standard equipment for press photographers, especially in the USA, from the late 1920s well into the 1960s, the Speed Graphic changed the

way news-making events could be documented and revealed to the world. For starters, it could be hand-held, but more importantly it was fitted with an ingenious focal plane shutter which had a speed range of 1/10 to 1/1000 second, enabling movement to be captured like never before.

The Graflex company was founded in 1887 in New York by William Folmer and William Schwing, and it initially made big, boxy sheet film cameras that had reflex-type viewfinders... yes, there was an 8x10-inch format SLR. In 1905 the company was purchased by Eastman Kodak and moved to Rochester where it operated as the Folmer & Schwing Division, continuing to manufacture large and medium format reflex cameras with built-in folding leather hoods to shade the viewfinder... a big step forward from using a piece of cloth. Folmer devised the focal plane shutter which employed tensioned roller blinds so the speeds were controlled by varying the width of a slit as it passed in front of the film. The same operation was employed in horizontal-travel, cloth-curtained focal plane shutters in smaller format SLRs for many, many decades. Demand for a smaller 'hand and stand' camera saw the creation of the Speed Graphic which employed a 'dropped' design. The bed folded down and then served as both a support for the lens standard and a track for the focusing bellows (Linhof was doing the same thing in Germany). The later Speed Graphic cameras famously had a large wire frame 'sportsfinder' on the lens standard to supplement the optical viewfinder on the main body. The lens standard provided a vertical shift (or rise) adjustment for perspective control and, on later models, tilted for control over sharpness distribution. Depending on the model series, Speed Graphics were available in a variety of sheet film sizes from 2.25x3.25 inches to 5x7-inches. Flash-synchronised shutters and mounts for attaching a flash gun (the bulb-type) were fitted from the late 1930s.

Graflex eventually became a division of Singer before being dissolved in 1973 when all the tooling for the Speed Graphic was sold to the Japanese large format camera maker Toyo. Over the decades Speed Graphics recorded numerous momentous events around the world and no doubt a great many not-so-momentous ones. However, it's worth noting that from 1942 to 1954 all the Pulitzer Prize winning news photographs were taken on a Speed Graphic, so it can rightly lay claim to being the world's most famous press camera.

38 Agfa Iso Rapid (1964)

Two imperatives continually drove the designers of snapshot cameras - right from Kodak's original Brownie - make 'em smaller and make 'em easier to use. In terms of the latter, loading and unloading film was a major area of difficulty, perceived or otherwise, for many users. Overcoming this difficulty led Kodak to the Instamatic cartridge, but Agfa's idea was the Rapid cassette which contained 35mm film and the system worked on the same principle



as rollfilm spools. A full cassette was gradually unloaded into an empty one as each frame was exposed and wound on. No threading was required and no rewinding. The empty Rapid cassette was simply transferred to the take-up side of the camera and you were ready to go again. Rapid cassettes could also relay the film's ISO to the camera, but the Iso was a keep-it-simple Instamatic-style model, albeit rather smarter with a combined alloy-and-plastic body.

37 Mamiya M645 (1975)



The once popular 6x4.5cm format had fallen out of favour after WW2, but it was revived in 1975 by the appearance of the M645 box-form SLR. Apart from being the prettiest looking medium format reflex camera ever seen, the M645 represented an appealing balance between image size and hardware size... plus it delivered 15 frames from a roll of 120 film so the economics were a bit better than the 6x6cm and 6x7cm formats. The lenses and viewfinders were interchangeable, but not the film back, but there was a system of pre-loadable inserts that sped up the changeover process. The viewfinder options included metering prisms and Mamiya built up a system of lenses that wasn't far off those of the major 35mm SLRs for size and choice... it eventually spanned from a 24mm fish-eye to a 500mm telephoto.

The idea of a 6x4.5cm SLR was eventually also picked up by Bronica, Contax, Pentax and - surely the most significant acknowledgement of the attractions - Hasselblad with its H-System. Today the 6x4.5cm SLR is the cornerstone of the digital medium format camera systems from Hasselblad, Mamiya Leaf, Pentax and Phase One.

36 Canon T90 (1986)

For a comparative latecomer to the professional 35mm SLR – around 11 years after Nikon – Canon soon made up time by daring to innovate in a category that had been traditionally extremely conservative. As the dawn of autofocus broke, the T90 was Canon's last stand with its old FD mount, but the camera was ground-breaking in its futuristic-looking styling and ergonomics (which introduced the concept of an input command wheel). Based on past experience, you'd have expected pros to run for the hills, but instead they embraced the T90 with enthusiasm... probably because when you actually handled and used the camera, it all made sense. Under the skin, the T90 was still actually pretty conservative, but the external design subsequently became fairly standard in the EOS autofocus SLR system (and beyond) and still informs D-SLR styling today.

35 Pentax Zoom 70 (1986)

The man behind the Zoom 70 – Pentax's chief designer at the time, Minoru Suzuki – once revealed in an interview that the camera nearly didn't happen because the company's management didn't believe a zoom lens belonged on a lens-shutter camera. Suzuki-san thought otherwise and convinced his bosses to let him tackle the fairly substantial engineering challenges... not only did the lens have to zoom, so did the viewfinder and the flash. By today's standards, the Zoom 70 is a brick, but back in the mid-1980s its size was quite an achievement. "When you look at it now, it looks very big," conceded Minoru Suzuki in the 2003 interview, "but at that time it was amazing we managed to make it as small as it was. It was very, very difficult to achieve."

Pentax went the whole way and installed a powered zoom – some later models still had

manually zoomed lenses – with autofocus, a motorised film transport and even automatic parallax correction in the viewfinder. All this required a six-volt lithium battery pack to run – which helped contribute to an all-up weight not very far off half a kilo – but the Pentax Zoom 70 has the distinction of being the first of many.

34 Olympus XA (1979)

Olympus has built a big reputation out of thinking small. It started with the half-frame Pen cameras, continued with the sensational OM SLR system and carried on into the 1980s with the XA range of 35mm compacts. The common factor across all three series is the brilliant designer, Yoshihisa Maitani (1933-2009), and with the original XA he created the smallest 35mm rangefinder camera ever made. It employed a clever 'clamshell' design whereby a sliding lens cover (which also protected the viewfinder) served as the power switch and made the camera truly pocketable. The XA was tiny at a time when microprocessors had yet to find their way into compact cameras, although this was partially achieved by omitting a flash (which was available as a clip-on accessory). Nevertheless, the XA still had an excellent 35mm f2.8 lens and aperture-priority auto exposure control. By the way, when Maitani did have micro-electronics at his disposal, he came up with another marvel of downsizing, the Olympus Mju.

33 Canon A-1 (1978)

This Canon press image from the time shows the A-1 fitted with one of the early attempts at an autofocus 35mm lens. Canon's 35-70mm AF zoom used active triangulation (via infrared beams) to determine the subject distance and the bulk comes from the batteries needed to power the focusing motor. There had to be a better way... and, of course, there was.

When you look closely at the development of the 35mm SLR, Canon wasn't really an innovator in the same way as Minolta, Olympus or even Pentax were, but when it did do something

significant, it was generally a big deal. The A-series 35mm SLRs, in particular, represented a particularly fruitful period, essentially laying the foundations for Canon's later successes in both film and digital SLRs. The best-selling AE-1 has a separate entry here, but the AL-1 (a focus-assist model), AT-1 and AV-1 all did their bit for Canon's rise through the sales charts. However, it was the flagship A-1 that gave the brand some serious kudos.

It's taken for granted today, but with its choice of program, shutter- and aperture-priority auto, manual and auto flash exposure modes, the A-1 was a sensation. It was also the first 35mm SLR with a program exposure mode and could be fitted with a motordrive capable of a zippy 4.0 fps. It was several years before the competition caught up.

32 Pentax (Spotmatic) ES (1971)

Having popularised the 35mm SLR through the 1960s with the original Spotmatic, Pentax was determined to keep the momentum going in the early 1970s by incorporating the very latest technology of the day... automatic exposure control via an electronically-controlled shutter. The first Electro Spotmatic (ES) model was only built in very few numbers (around 2300) as a trial run and wasn't sold outside Japan. After a few tweaks, the ES appeared in late 1971 as the world's first 35mm SLR with aperture-priority automatic exposure control. The electronic shutter had an automatic speed range of one second to 1/1000 second while there was a set of mechanical speeds – from 1/60 to 1/1000 second – as back-up in the event of battery failure. The ES also introduced the idea of an exposure compensation control with a basic range of settings for 1/2x (i.e. -1.0 EV), 2.0x (+1.0 EV) and 4.0x (+2.0 EV).

Incidentally, the prototype electronic model – called the Metallica II – had been first shown five years earlier at the 1966 Photokina in Germany so Pentax was very much at the forefront of 35mm SLR development during the 1960s. The ES was followed by the ES II in June 1973 which extended the automatic shutter's slow speed range down to eight seconds, expanded the metering's ISO coupling range and included shutter speed read-outs in the viewfinder. Before too long, every major manufacturer of 35mm SLRs had an aperture-priority auto model... except Canon which opted for shutter-priority auto control.

SPECIAL FEATURE

31 Mamiya RB67 (1970)



The 120 rollfilm camera world had long been dominated by the 6x6cm format which had been especially popularised by the Rolleiflex TLRs and given a renewed lease on life by Victor Hasselblad's revolutionary 6x6cm SLRs. The square format made a lot of sense, but it often required cropping which sort of defeated the purpose of having a bigger image in the first place. The alternative was 6x9cm which made for very bulky equipment. So Mamiya came up with the first 6x7cm SLR – fully modular with a box-form body just like the 'Blads – and solved the orientation dilemma by giving it a rotating film back. This allowed the RB67 to be switched from the horizontal to the vertical in a matter of seconds while the camera and all its controls stayed exactly as they were. 'RB' stands for 'rotating back'. In typical Japanese fashion, Mamiya set out to build a mousetrap that was better in every department so, for example, the RB67 had bellows focusing to give increased close-up capabilities with any lens. Built tough and backed by a big system of lenses and accessories, the RB67 quickly became an appealing alternative to the 500-series Hasselblads for professional photographers. To a great extent, the two camps still exist today even though both base their digital medium format camera systems on 6x4.5cm format platforms.

30 Kodak 'Vest Pocket' VPK (1912)

The Vest Pocket Kodak wasn't the first compact – or pocketable – rollfilm camera to appear as photography began to move beyond being merely curiosity, but it was the first to be mass-produced and undoubtedly helped fuel the new medium's growing popularity. The British-made Ensignette from 1909 started the trend towards 'pocket-sized' cameras – by the way, this was generally taken to mean the pockets in a gentleman's waistcoat – but it was Kodak which capitalised on it with photography's equivalent of the Ford Model T. The VPK employed a collapsible design with a lightweight aluminium body and a lens which extended on bellows supported by 'lazy tongs' struts. Unlike Kodak's other 'folders' there was no bed so the lens plate retracted flush with the rest of the camera body to create a very compact package just 25 mm in thickness. The VPK took 41x64 mm frames on the new 127 rollfilm which used smaller spools

especially developed for it. It employed Kodak's newly-devised 'Ball Bearing' three-bladed shutter which had speeds of 1/25 and 1/50 second as well as 'B' and 'T' settings. Built in a number of countries, the VPK could be had in a variety of versions including a luxury, leather-covered model fitted with a Zeiss Tessar 72mm f6.8 lens. The standard, black enamel bodied version most commonly had a simple meniscus achromat lens and a set of four aperture settings marked '1', '2', '3' and '4' which corresponded, respectively, to "near view/portrait", "average view", "distant view" and "clouds/marine". The basic camera cost around US\$6.00. The VPK Special had a multi-element Kodak Anastigmat 75mm f8.0 lens and conventional aperture settings. Over time, Kodak allowed a variety of lenses to be fitted to the Special, including those made by Cooke, Bausch & Lomb, Ross and the French company Berthiot.

In 1915 Kodak added its 'Autographic' feature to the VPK which cleverly allowed for a one-line note to be written on the negative between the image frames. This was done with a metal stylus through a small flap in the back of the camera which opened to provide access to the backing paper. The pressure from the stylus on the backing paper – exposed in daylight – imprinted the handwriting onto the film.

The original VPK stayed in production until 1926 by which time around two million had been sold and photography's future as a pursuit accessible to all was assured.



29 Nikonos Calypso (1963)

Intrepid early photographers were dragging cameras where no camera had gone before almost immediately after the equipment became portable enough to be carried by man or beast. Mountains, remote jungles, polar regions, battlefields and even bird's eye views had all been revealed to amazed audiences, but the many wonders of the underwater world proved a little more difficult to record. There were many attempts, some more successful than others, including using large submersible spheres and various contraptions of modified land cameras. In 1895 a Frenchman called Louis Boutan managed



to take an 8x10-inch studio camera underwater complete with magnesium flash ribbons contained in special glass spheres.

The big breakthrough came in 1957 with the Calypso Phot, the world's first dedicated 35mm marine camera which was created by a Belgian inventor called Jean de Wouters in co-operation with another Frenchman, the famous ocean explorer Jacques-Yves Cousteau. First built in France, the original Calypso went on sale in 1961 and immediately revolutionised underwater photography by virtue of its compactness and lightness, ruggedness, ease of use underwater, complete watertightness down to 60 metres, choice of interchangeable lenses and synced electronic flash system. It was also considerably more affordable than any custom-built marine camera. The Calypso soon attracted the attention of Nikon which took over the camera and its production, renaming it the Nikonos (although the Calypso name was retained initially in France). The basic configuration of the Calypso was retained for the Series I, II and III Nikonos models up until 1980 when the all-new Nikonos IV-A with built-in TTL metering was introduced.

As had been happening in many other areas of photography since the 1900s, the Nikonos made shooting underwater a whole lot easier and much more accessible to the diving enthusiast as well as professionals. Marine photography entered a new era of technical advancement which, in turn, spawned ever greater levels of creativity.

28 Contax S (1949)

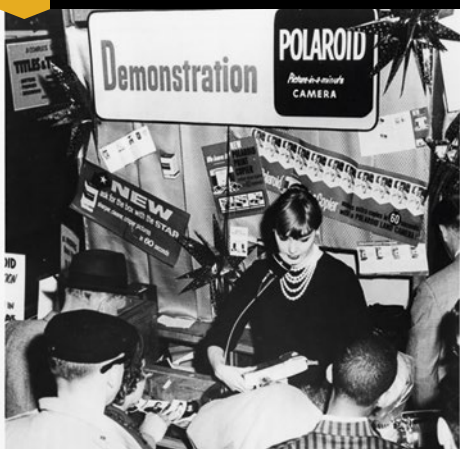


After the second World War, Zeiss Ikon was a company dramatically divided by the newly drawn-up political boundaries. As the Russians took control of eastern Germany, many of its engineers and personnel fled the company's headquarters in Dresden to relocate themselves at its factory in Stuttgart. However, clearly some

talent stayed behind because, in 1949, the eastern Zeiss-Ikon unveiled the world's first SLR camera with a pentaprism-type viewfinder. In truth, development on what became the Contax S had started before the war and the original designer, Hubert Nerwin, was one of those who fled to the west (eventually emigrating to the USA in 1947 to work for Graflex). Nevertheless, seeing the project to fruition still needed skilled guidance and the Contax – disputes over actual usage of this brand name weren't resolved until 1959 – made its debut at the 1949 Leipzig Spring Fair (where, 24 years earlier, the first production Leica had been revealed). The 'S' stands for *spiegelreflex* which is German for 'reflex mirror' and the Contax pointed decisively to the way ahead for 35mm SLR design. Not only did it have the pentaprism finder, but also a focal plane shutter with a top speed of 1/1000 second and the new 42mm-diameter screwthread lens mount. However, the Contax S was still stuck in the past in some areas, including a non-return mirror, knobs for film advance and rewind, no preset apertures and the absence of any focusing aids.

Although the Japanese were undoubtedly some way behind, when the Asahi Pentax appeared in 1957 it was the more fully resolved design which the rest of the world would follow in its entirety. Nevertheless, the Contax S was still a remarkable achievement, especially given the upheavals during its gestation, and it was refined in subsequent versions such as the F (1956) which introduced semi-automatic diaphragm control and the FM (1958) which had a split-image rangefinder. Legal tussles with the western Zeiss Ikon resulted in the adoption of the name Pentacon – derived from pentaprism and Contax – used on cameras sold outside the Eastern bloc. Ironically, Zeiss Ikon in Dresden also trademarked the name 'Pentax', but subsequently licensed it to Asahi Optical in 1954.

27 Polaroid Model 95 (1948)



People flocked to the first demonstrations of the Polaroid Model 95 at a Boston department store. The camera sold out very quickly so even demo and display models were scooped up.

Driven by his daughter's imploration, "Why can't I see the picture *now*?" after he'd taken some family snaps at Christmas in 1943, Dr Edwin Land spent the next three decades solving all

the problems in order to arrive at a truly workable 'one step' colour print system. However, he once recalled, it only him took a few hours on that Christmas Eve to work out the basic process for instant photography. Mind you, it still took four years to bring this idea to fruition, by which time Land could demonstrate the creation of 8x10-inch B&W prints just minutes after the photograph had been taken.

The Polaroid Model 95 – the first of the 'Land cameras' – went on sale in late November 1948 at a department store in Boston priced at US\$89.75 which made it very much a luxury item. Nevertheless, it was, pardon the obvious pun, an instant hit, and the sales staff ended up selling all the display samples too (some even missing parts). Virtually overnight Polaroid became a household name and sales of over a million cameras were achieved by the middle of the next decade. Land's peel-apart B&W instant prints were made possible by his devising of

A newspaper advertisement for the first Polaroid camera, heralded as "one of the greatest advances in photography".

an immensely powerful developer and rapid fixer combined in a highly-viscous jelly that could be spread evenly but very thinly. It became affectionately known within Polaroid as "the goo". This potent brew was contained in a small foil pouch – called "the pod" – which was designed to rupture along one edge as the print passed through rollers on its way out of the camera. The basic principle of "the goo" and "the pod" remains at the heart of instant photography which culminated in a single-sheet, dry and stable self-developing colour print.

Although the original corporation is long gone, the Polaroid brand and, surprisingly, instant photography in various forms live on defiantly in the digital age.

26 The Sinar (1948)



Carl Koch's first Sinar system camera was called the Norma and was unveiled in 1947, going on sale a year later.

While Victor Hasselblad was revolutionising the rollfilm camera, a Swiss photographer called Carl Koch was doing the same for the large format camera. Koch was struck by the fact that there had been numerous advances in amateur equipment, but pros were still carrying around what amounted to a garden shed on a tripod. His solution was to ditch wood in favour of aluminium and base his camera on a monorail which supported U-shaped bearers for the lens board and film holder. The monorail could be extended and the U-shaped bearers allowed for an extensive range of movements to control perspective and sharpness. Koch called his new monorail camera system the sinar – derived from the first letters of studio, industry, nature, architecture and reproduction – and it went on to become the camera of choice in large format photography for the next 50 years.

25 Olympus Pen (1959)



One of the long line of Olympus Pen 35mm compacts, the EE-S had a built-in selenium cell exposure meter located around the lens which allowed for auto exposure control and point-and-shoot operation.

The genius of Olympus's legendary camera designer Yoshihisa Maitani first came to light with the Pen-series of compact cameras based on the half-frame 35mm format. Half-frame 35mm allowed for a significant reduction in the size of the camera without overly compromising image quality... and, of course, the number of exposures obtained from a roll doubled which made the economics attractive too. It was a stroke of genius and the immediate success of the first Olympus Pen models convinced quite a number of other Japanese camera makers to adopt the format. It remains a bit of a mystery why we subsequently had to have 110, Disc and APS when the 18x24mm image size worked so well and didn't require a new film format (Konica and Yashica attempted a brief revival in mid-to-late 1980s).

When it was unveiled in late 1959, the first Olympus Pen was a revelation as it combined exceptional compactness with a good level of features and specifications. Focusing was manual and exposure control was via adjustable apertures with a choice of four shutter speeds. The early models weren't actually built by Olympus, but as sales began to take off, the company decided to take over production

Carl Koch demonstrates his creation to the board of the Swiss Photographers Association in 1947.



itself. With the Pen EE, launched in August 1961 – the initials stood for 'Electric Eye' – a selenium cell meter was added around the lens, allowing for auto exposure control and creating a hugely popular camera. The EE-S version (illustrated here, and launched in 1962) had zone-type focusing rather than a fixed-focus lens. Subsequent models had a CdS-type meter, a wider-angle lens, improved film loading (there was a version for Agfa Rapid cassettes) and even a motorised film transport. In the end, Olympus sold over two million half-frame Pens and then Maitani performed another clever trick by desiging a full-frame 35mm camera that was just as small... the XA.

24 Nikon F3AF (1983)



There's quite a bit of irony surrounding the F3AF. Firstly, Nikon chose to debut autofocus on a professional level 35mm SLR... and the F3 had already been given a rough ride from professionals because it had an electronically-controlled shutter and aperture-priority auto exposure control! An autofocus F3 surely had to be a bridge too far? It arrived ahead of the Minolta 7000 by over two years and represented the first system that unified all the components to enable seamless operation. It was based on the DX-1 AF viewfinder module (although a dedicated camera body was required as well) which incorporated the electronic rangefinder, data processor and the power supply for the autofocus lenses. These, curiously, had built-in focusing motors, even though when Nikon eventually launched its full AF SLR system in 1986, the focusing motor was in the camera body. It's still not clear why Nikon changed tack so dramatically in the intervening years only to – much later – return to using focusing motors in its lenses (and exclusively so in today's lower-end D-SLRs). With the basic configuration of F3AF Nikon had come up with a very forward-thinking concept – Canon's essentially similar system didn't appear until 1987 – which wouldn't have been hard to apply to non-professional bodies. Interestingly, the only two lenses released with the F3AF – an 80mm f2.8 and a 200mm f3.5 – also autofocus on Nikon's two subsequent 35mm AF SLRs, the F501 and the F4. Who knows what might have happened if Nikon had stuck to its original ideas for an autofocus 35mm SLR?

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23 Canon EOS D30 (2000)



The foundations for Canon's ongoing success in the D-SLR market were very much laid by the EOS D30 and the equally game-changing EOS 300D. Before the D30, D-SLRs were prohibitively expensive and, in many cases, limited in their capabilities. Tellingly, the D30 was Canon's 'home grown' D-SLR – all the previous models had been in collaboration with Kodak – so it was with this model that the company not only defined its concept of the future, but took charge of its part in it. The EOS D30 is a true milestone in the development of the digital SLR and from here Canon never looked back, dominating the market with a string of subsequent models which offered progressively more resolution, speed and affordability. But for starters, the D30 had 3.2 megapixels, 3.0 fps, a 32 MB buffer memory (enough for eight frames) and a maximum sensitivity of ISO 1600. These were heady specifications for the time, but more importantly, for the first time, here was a D-SLR with appeal beyond just the professional sector. It was also the first D-SLR that the serious enthusiast could actually contemplate purchasing. Consequently, the D30 was instrumental in not only building Canon's D-SLR business, but in turning the whole category into something much more viable. Among the D-SLR 'firsts', this is arguably the most significant of them all.

22 Ihagee Kine Exacta (1936)



The world's first 35mm SLR is indeed a very significant camera given how this combination of format and viewfinder configuration would become the staple of photography until the end of the film era. The Kine Exacta I had its roots in

the original Exacta (later known as the Exacta A) from 1933 which featured a compact metal body, reflex viewing (via a waistlevel hood), focal plane shutter and interchangeable lenses, but recorded 4x6.5 cm frames on 127 rollfilm. It was a small jump to adopt the format derived from cine film for an even more compact camera. The bodysell was aluminium, the shutter had a speed range of 12 seconds to 1/1000 second and the mount was a bayonet fitting... so essentially all the elements of a 'modern' 35mm SLR were there right from the beginning. Viewing was via a waistlevel finder with a folding hood and built-in magnifier, but there would have been a pentaprism-type arrangement much earlier, but for the intervention of WW2. Consequently, the Exacta V (short for Varex) didn't appear until 1950, but was still the first 35mm SLR with an interchangeable prism viewfinder.

21 Olympus Digital Pen E-P1 (2009)



We still have no real idea of where the concept of the compact system camera (CSC) will lead us, but here is where it all started. It's quite an event when a brand new category of camera appears for the first time and Olympus made it even more special by giving the E-P1 a link with the original idea... the Pen F half-frame SLR. This gave the E-P1 real relevancy and the retro-styling made it an instant hit with enthusiasts... even if the target market was originally compact camera users too timid to tackle a D-SLR. It also helped that the short flange back distance of the Micro Four Thirds format enabled all manner of 35mm RF and SLR lenses to be fitted via adapter rings. Subsequently, and probably unwittingly, Olympus also created a whole new industry of third-party accessories, particularly mount adapters... which has only been further boosted by the arrival of the OM-D system. Like all great cameras, the E-P1 was flawed, but such was the sheer brilliance of its conception, the failings in the execution could be forgiven. Of course, most of these failings have subsequently been addressed in the E-P2 and E-P3, but perhaps most spectacularly in the E-M5. Nevertheless, the E-P1 can be assured of its place in the history of the still camera.

20 Minolta 7000 (1985)

Everybody had been playing with the idea of an autofocus 35mm SLR for quite a while and there had been some meritorious early attempts... Canon AL-1, Ricoh XR-F, Pentax ME-F and, the

best resolved of them all, Nikon's F3AF. Minolta had been about to join the electronic rangefinder brigade with the still-born X600 (we know it existed, we saw a prototype), but obviously decided this solution was still a bit half-baked and more refinement was needed. Everybody already had all the pieces, but it was Minolta that finally put them all together to create the 7000. The clever bit was to take the focusing motors out of the lenses and put one compact drive in the camera body. Consequently, the AF lenses went back to normal dimensions and, in fact so did the camera body. Nikon followed suit with a body-integrated AF motor, but Canon famously opted to use lens based motors. The development of more powerful micromotors and ultrasonically-pulsed actuators had subsequently seen everybody opt for the efficiencies of lens-based AF drives, but Pentax, Sony and the higher-end Nikon D-SLR bodies still retain focusing motors.

19 Rolleiflex SLX (1976)



Things changed very slowly in the medium format camera world so the almost-futuristic SLX was an immensely courageous move by Rollei. The 6x6cm SLR hadn't changed since the last 'big bang' – Hasselblad's 1600F in 1948 – and everybody, including Rollei, had adopted the same formula. Consequently, the SLX came as something of a shock. It was the world's first 6x6cm with an electronically-controlled shutter, but that was just the tip of the iceberg because it also had a built-in autowinder, TTL metering (using a state-of-the-art three-element silicon sensor), and shutter-priority automatic exposure control. The lens diaphragm was also electronically controlled. It's worth remembering this is the same year Canon introduced its shutter-priority auto AE-1 35mm SLR. The medium format SLR world would never again be quite so much in step with 35mm SLR technologies. Furthermore, the SLX had a LED-type viewfinder display, a rechargeable and interchangeable battery pack and an ingenious system of preloadable film inserts which eliminated the need to swap over the empty

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spool each time. The SLX-series lenses and body communicated via gold-plated contacts and the shutter release button was electromagnetic. It was, quite simply, very, very advanced for the day.

18 Konica C35AF (1977)



The Konica C35 AF was the first fully automatic 35mm compact camera and it spawned a category that stayed immensely popular for two decades... and then carried on with film replaced by a sensor. The fixed-lens compact camera may now be under some threat from the smartphone, but the 35mm version exceeded all other formats in the variety of models and volume of sales... which, of course, in turn generated extra profits in the processing and printing of the film. These were indeed the glory years of mass-market film photography.

The steps towards the C35 AF had been many and various, and not all of them had been made by Konica, but it was the oldest of the Japanese camera companies which put it all together to create the recipe everybody would follow.

Non-reflex 35mm 'EE' cameras – the initials stood for 'electronic exposure' – with built-in metering and auto exposure control were available well before such luxuries were provided on 35mm SLRs. The last big hurdle was autofocus and, in the mid-1970s, there were a number of competing methodologies. Konica opted for Honeywell's VAF – Visitronic Auto Focus – system which was essentially an electronic rangefinder coupled to a small stepping motor to drive the lens. Focusing had always been problematic in snapshot cameras – which is why so many simply didn't provide any adjustment at all – but now much greater accuracy could be achieved with no more effort. The C35 AF's brochure described it as "a revolutionary new camera that will change the method of photography from this time on". This was no doubt originally penned as a bit of promotional hyperbole, but rarely has such a prophecy proved quite so accurate.

17 Canon AE-1 (1976)

The AE-1 was the first 35mm SLR of the computer age in that it was controlled by a CPU to provide shutter-priority automatic exposure control. The electronically-controlled shutter's speed range was 2-1/1000 second. An optional



autowinder allowed continuous shooting at up to 2.0 fps, but on its own the camera was very compact thanks to the microprocessor replacing a great many electronic components.

Canon had done some good things previously, but this was the camera that really helped establish the brand in the minds of amateur photographers and, from here, it would rise inexorably through the rankings. Mind you, Canon also backed its new baby with an advertising campaign the extent of which had not been seen before for a 35mm SLR. The following A-series cameras all made an important contribution to Canon's growing reputation, but none quite as significant as the AE-1 which, behind the scenes, also revolutionised production techniques via its increased usage of plastics and electronics which allowed for increased automation and reduced costs. Not surprisingly, Canon stuck with this platform when it introduced programmed exposure control to a lower price point with the AE-1 Program in 1981. However, the original AE-1 stayed in production all the way up to 1984, selling a total of five million units in the process.

16 Minox 'Spy' (1937)

Probably more famous for its roles in film and TV spy dramas, the Minox 8x11mm format cameras were genuinely an important tool in espionage for many decades. However, it was an application the German-Latvian inventor Walter Zapp had in mind when he first started working on his ideas for a subminiature camera in the middle of the 1920s. Zapp claims he dreamed he saw somebody using a camera of the design he would eventually adopt – whereby it was held horizontally and operated by pulling part of the body out and pushing it back in again – and there was certainly nothing like it in real life. Solving the mechanical challenges took a good few years, but in 1932 Zapp eventually built a wooden model of his camera and a prototype was completed in 1936. He also had to overcome the considerable challenges associated with designing and making a very small objective lens. The name 'Minox' was derived from the word 'miniature' and the suffix 'ax', then popular in camera names, but this was later changed to 'ox' because it sounded better. The prototype featured a push-pull rapid film winding system just as Zapp had seen operating in his dream.

Zapp hawked his camera around a number of camera manufacturers before finding a partner in VEF – Valsts Elektrotehniska Fabrika – which

made radios and other electronic devices and was based in his birthplace of Riga. The Riga-Minox was introduced in 1938. and was slightly bigger than Zapp's prototype as the film format had been enlarged from his original idea of 6.5x9.0 mm up to 8x11 mm. The body components were made from stainless steel, the lens was a 15mm f3.5 'Minostigmat' and the shutter had a speed range of 1/2 to 1/1000 second. Being so small, the lens delivered huge depth-of-field so there was no need for an aperture diaphragm and focusing was only necessary for close-ups. Interestingly, the first example was sold to a member of Latvia's diplomatic service and is believed to have been used for espionage purposes. Zapp hadn't envisaged his camera being used this way, but the Minox subsequently became the camera of choice for intelligence gathering during the Cold War years.

After WW2 Zapp set up shop in Germany, established the Minox company (which was financed by a tobacco company) and, in 1948, introduced the Minox A with an aluminium body so it weighed just 70 grams. In 1958, the Minox B was introduced and it had a built-in selenium cell meter. It's the famous of the Minox 'spy' cameras and also the most popular – 384,000 had been built by the time production ceased in 1972. Subsequently, Minox built both 110 and 35mm cameras.

Like many of the famous German camera makers, Minox experienced a number of financial traumas during the 1980s and 1990s (it was owned by Leica for a while), but the company has survived although the emphasis is now on optical products such as binoculars and spotting scopes... and there's a digital spy camera.



15 The Leica (1925)



An original Leica 'O-series' preproduction model pictured behind the replica which Leica released in 2000. Just 31 O-series cameras were built as a trail run in 1924 prior to the release of the first Leica (with some minor design changes) a year later. Not surprisingly, the originals are incredibly valuable now.

"I have decided... we shall risk it." It was a decision which would change photography utterly and completely. The man who spoke these words was Ernst Leitz II and the pronouncement came at the end of a long meeting to discuss the idea of manufacturing a camera. The camera was designed by Oskar Barnack who joined Leitz's company – which made microscopes – in 1911 as an optical engineer. A keen hiker and amateur photographer, Barnack also suffered from chronic asthma which reduced his capacity to carry big, heavy cameras on his walks. A few small camera designs were already around, but the problem was obtaining a good quality enlargement. Barnack's idea was to use a film created from two 18x24 mm movie frames to give an image area of 24x36mm and so reduce the amount of enlargement required.

A couple of prototypes were built and successfully trialled, but then the first World War intervened so it wasn't until 1924 that a small run of cameras was made to test the market and, more importantly, convince the doubters at Leitz that such a product would be viable. After much debate, Ernst Leitz II made his decision and the following year the first Leica 35mm camera made its debut at the 1925 Leipzig Spring Fair. The name 'Leica' was from Leitz camera, and only adopted at the very last minute.

Sales were initially slow – probably testing Leitz's resolve – but then word began to spread about the benefits of the Leica's compact dimensions combined with its comparative ease of use and exceptional quality. It brought a new technical freedom to photography which revolutionised areas such as reportage and documentary work. By 1936, 200,000 units had been sold and the name Leica was well on the way to becoming one of the most important in photography.

14 Kodak Instamatic (1963)



The earliest Instamatics had a pop-up holder for a flash bulb (on the left) while later models accepted four-bulb 'Magicube'. Triggering was via percussion caps so these models didn't require a battery.

If ever there's an example of the genius pool that was Kodak for a good deal of the 20th century, it's the Kodapak film cartridge which was created for the Instamatic range of point-and-shoot cameras. It was a brilliant solution to the problems many snap-shooters had with loading and unloading 35mm film (by now the format favoured by the Japanese camera makers). The plastic cartridge – subsequently designated '126' – was loaded with 35mm-wide film and was designed so it could only fit into the camera one way. The film itself was never handled and so a whole range of potential problems were eliminated. Instamatic cameras went on to sell in huge numbers – around 70 million during the 1960s and early '70s – subsequently documenting the lives and times of a generation on the distinctive 28x28 mm negatives (although Kodachrome was also packaged in 126 cartridges). The earliest models had a built-in pop-up holder for a single 'peanut' flash bulb, but from 1966 the four-bulb 'Flashcube' could be fitted, although all these required battery power to provide the trigger pulse... somewhat compromising the concept of absolute Instamatic simplicity. In 1970, however, Sylvania introduced the 'Magicube'

which didn't require a battery (using percussion caps instead) and these could be fitted to Kodak's X-series Instamatics.

Not all Kodak's Instamatic cameras were basic – the 400-series, for example, had aluminium body frames, rangefinder focusing, spring motors and either selenium-cell or CdS exposure meters – and there was even an Instamatic SLR which was made in Germany and accepted Retina S-mount lenses. The format was also adopted by, among others, Agfa, Hanimex, Halina, Rollei, Ricoh, Minolta, Voigtländer, Yashica and Zeiss Ikon (which also made a 126 SLR).

13 Rolleiflex TLR (1929)



There were many, many limited edition Rolleiflex TLRs, including this 2.8 GX model which commemorated the camera's 60th anniversary in 1989.

In photography necessity has always been the mother of invention and a number of very pressing needs gave rise to the Rolleiflex twin lens reflex (TLR) camera, a design that survived in one form or another for over 65 years. The Rolleiflex has its origins in a camera that was designed for use in the WW1 trenches and was essentially an upside-down TLR that could be poked over the lip on a small scissors lift and had a viewfinder which was used a bit like a periscope. After the war ended, the trench camera was reworked into a civilian model which was operated the right-way-up. Its designer, Reinhold Heidecke, first offered it to Voigtländer who rejected it so he then decided to manufacture it himself, but couldn't raise the funding. He eventually joined forces with a wealthy young industrialist, Paul Franke, and the pair established the company Franke & Heidecke in 1919. Various other projects initially kept F&H busy, but the rollfilm TLR eventually went into production in late 1928. It was the first mass-produced reflex camera of any type. Sales started in 1929 and, by the end of the year, the company held back orders for 8000 cameras.

The idea of a rigid-bodied rollfilm camera with reflex viewing that was portable, reliable and easy to use was very appealing and, by 1932, 28,000 Rolleiflexes had been built. By the start

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of WW2 this number had reached 400,000 and, in 1956, the millionth Rolleiflex TLR was sold. Such was its combination of capabilities and portability, the camera was used widely in many fields, including press photography, weddings, portraiture and landscapes.

Despite the growing popularity of rollfilm SLRs and the 35mm format, the Rolleiflex TLR remained in volume production until the end of the 1970s and was still built in limited numbers for much longer. While the SLR ultimately proved more convenient in many areas, Reinhold Heidecke's TLR was revolutionary when it was launched and the Rolleiflex then remained the camera of choice for a great many professionals and amateurs for four decades.

12 Sony Mavica (1981)



Sony's prototype Mavica video still camera shown with the optional flash unit fitted. This particular example is from the collection of the JCII Camera Museum in Tokyo.

The idea of 'filmless' or electronic still images dates to the early 1950s and the development of systems for recording television pictures using magnetic tape. Once this was achieved it was only a short jump to capturing and recording still pictures using the same techniques, but these processes were analog so achieving an acceptable image quality was the challenge. This would eventually lead to fully digital imaging systems – which Kodak had started working on in the mid-1970s – but for a while it looked like the future of electronic imaging lay in the still video camera. It recorded an analog signal in exactly the same way as a video frame (i.e. via lines in two interlaced fields) except that there was only one frame rather than 25 or 30 per second (i.e. PAL or NTSC).

Without any history in film photography, Sony was a driving force behind the development of electronic still cameras and launched the original Mavica in August 1981. The name was derived from the first two letters of each word in Magnetic Video Camera. The Mavica was an SLR with interchangeable lenses so it was over three decades ahead of similar digital designs such as Olympus's E-300 and E-330 models. The Sony recorded analog video stills – via a CCD



Press photo showing the Mavica system including the lens system (25mm f2.0, 50mm f1.4 and 16-65mm f1.4) and two-inch Video Floppy Disks (initially called 'Mavipak' disks by Sony).

sensor – onto two-inch magnetic disks which were housed in rigid cassettes. This format was eventually adopted universally as the 'Video Floppy' (VF) disk and used by Canon, Panasonic and Minolta in early still video cameras. As an aside, the VF disk survived in other applications long after the still video camera had been consigned to history by the emergence of digital image capture systems.

With the way ahead in electronic imaging so uncertain in the early 1980s, Sony didn't proceed with its original Mavica system, but it did introduce a number of analog models later in the decade before also switching to developing digital systems (which revived the 'Mavica' name in 1997).

It may not have been immediately apparent at the time, but Sony's prototype 'filmless' still camera very much pointed to the way ahead... and very much ahead of the times. The technology employed would change, but the underlying principles are still those in use with current designs.

11 Polaroid SX-70 (1972)

Even in the digital era there hasn't been a camera that packed quite so much pioneering technology as the SX-70. The camera was an SLR that folded flat and it incorporated the world's first fully automatic exposure control system which worked with both available light and flash, achieved through the most advanced use of electronics that had ever been seen in a camera of any type to date. In 1978 Polaroid introduced the 'Sonar Autofocus' SX-70 which was the world's first autofocus SLR camera and the first of any sort to use ultrasonic sound waves to determine subject distance. However, the really remarkable technology was the SX-70

system's self-developing film which delivered a dry, stable colour print in under a couple of minutes. Cleverly, the camera's print ejection motor was powered by an ultra-thin battery in the film pack... so you never ran out of power.

With all the original patents locked up following the demise of the original Polaroid, no wonder the organisation which committed to reviving the SX-70 and later 600-series self-developing colour films called themselves 'The Impossible Project'. Happily, it has succeeded, bringing renewed life to one of the most remarkable cameras ever made.



10 Olympus OM-1 (1972)

If we were awarding accolades for 'Taking the industry by surprise' then the OM-1 would be in the number one spot. While its rivals were all pre-occupied with how auto exposure control might be implemented in 35mm SLRs, Olympus redefined the whole category with the down-sized OM-1. It was immediately clear that big was no longer better, but it would take a while before anybody came up with anything to rival the OM-1 for compactness (by which time the aperture-priority auto OM-2 had arrived too). Just over 40 years later, the OM-1 is still a glorious



piece of camera design; pleasingly styled and with a control layout that bucked convention, but worked exceedingly efficiently. Of course, it also helped that Olympus backed the OM cameras with exceptionally high-quality optics. Pick up a -1, -2, -3 or -4 and you'll still be immediately beguiled with its sheer 'rightness'. No wonder Olympus is hoping history will be repeated.

9 Pentax Spotmatic (1964)



Some might question why the Spotmatic gets in ahead of the OM-1, but this was the camera that popularised 35mm SLR photography to the extent that a healthy market actually existed eight years later. Pentax had already established the basic blueprint for the 35mm SLR, but there was still the challenge of incorporating metering. Add-on or non-coupled meters just weren't going to cut the mustard in the decade of change – which didn't just extend to social mores – so Pentax first experimented with a spot meter on an arm that extended into the centre of the frame. Sensibly, this was deemed too complex, but the original name – “Spot-Matic” – was kept for the camera which eventually emerged with a fully-averaging meter using two CdS-type photocells located in the viewfinder.

Combined with the pentaprism viewfinder, quick-return mirror, film advance lever and many more conveniences, built-in metering made the Pentax Spotmatic the most accessible 35mm SLR ever seen. It was affordable too, and once it was seen in the hands of various members of 'The Beatles', it quickly became the hottest camera on the market.

8 Hasselblad 500C (1957)



Although it was nine years earlier that Victor Hasselblad had unveiled his revolutionary design for a 6x6cm SLR, it wasn't until the 500C model that the real potential of his creation was realised. With this model the problematic focal plane shutters of the earlier 1600F and 1000F bodies was replaced with a Compur leaf shutter in each lens (which also had the advantage of allowing flash sync up to its fastest speed of 1/500 second). Now the handling benefits of the 'Blad's box-form body and the convenience of its interchangeable film magazines could be fully appreciated. From here it didn't take long for the 500C to become a staple of the professional photography world, killing off the once-dominant TLR in the process. There have been many refinements along the way, but the basic configuration of the 500C lives on in the current 503CW now often used, of course, with a digital capture back fitted.

7 Canon EOS 300D (2003)



Three years after taking the D-SLR into new and profitable territory with the EOS D30, Canon did the same thing with the 300D. While the D30 forged into the advanced enthusiast sector, the 300D broke down the barriers that had prevented the D-SLR from becoming a consumer product. In fact, even professionals had been using the higher-end digital compacts because D-SLRs were still too pricey. Similar in size to a 35mm SLR and with similar operational characteristics, this is the camera that introduced a great many

amateur photographers to digital capture... in the process giving Canon an even bigger share of the market. The combination of a 6.5 megapixels sensor, sensitivity range equivalent to ISO 100 to 1600, 2.5 fps continuous shooting and a price tag under \$2000 (for the first time) was intoxicating. In our test report, in the November 2000 issue, we noted, “In the history of SLR photography, Canon's EOS 300D is almost certainly guaranteed 'milestone' status. In years to come it will be remembered alongside other significant models such as the Olympus OM-1, Canon A-1 and Minolta's 7000 plus, of course, Kodak's DCS 100. Prophetic or what?”

6 Kodak DCS 100 (1991)



What went wrong? This is the first of three Kodak cameras in the top ten, but today the brand's presence in consumer imaging is mostly through licensing deals with other manufacturers. With the DCS 100, Kodak invented the digital SLR and refined both the digital compact camera and the digital capture back to the stage where the useability and/or affordability were massively improved. All the early development in D-SLRs was driven by Kodak which eventually convinced the likes of Canon, Nikon and Fujifilm to get involved. Kodak's work in array-type sensor design was ground-breaking yet today even this part of the business has now been sold to somebody else.

Back in 1991 it all looked so promising as Kodak revealed its revolutionary digital capture system based on a Nikon F3 body. There had been a number of prototypes beforehand, including a compact autofocus K-mount D-SLR with a 1.3 megapixels sensor called the D-5000... in 1989! The DCS 100 was actually available in a number of versions (colour and B&W) and was actually just called the Kodak Professional DCS by the company itself. It included all the components of a current D-SLR except that the data storage (a 200 MB HDD), buffer memory, LCD monitor screen, image processors and power supply were all housed in a separate unit which was carried on a shoulder strap. The F3 was essentially stock standard – save for a special back housing the sensor – and fitted with an autowinder to enable continuous shooting at 2.5 fps. A year later, however, all the digital 'works' had been integrated into the DCS 200 camera which was based on the Nikon F-801S. Kodak sold a grand total of 987 DCS 100 kits, but from little things big things would grow.

5 The Kodak (1888)



This is a replica of the original Kodak camera which was made in 1988 to commemorate its 100th anniversary and is now itself collectible. The limited edition ran to 3200 units.

It's debatable whether this camera shouldn't be placed higher in this countdown – perhaps even at number one – such was the seismic changes it brought to photography. In reality, before Kodak's brilliant box of tricks, photography didn't really exist as a pursuit for the common man (or woman). Such were the complexities and expense of the medium, it was practised only by the wealthy and the eccentric. The original Kodak was not only a manageable size, it was easy to use right down to being supplied preloaded with enough rollfilm for 100 pictures. Once these were exposed, the camera was returned to the company where the film was unloaded, developed and prints made. The camera was reloaded and everything was then returned to the customer which led to the coining of the famous advertising slogan, "You press the button, we do the rest." It wasn't actually all that cheap, but it made photography accessible to amateurs and affordability soon followed. This came at the turn of the century with the first Brownie which was, almost quite literally, a box... as it was made from jute-board (a sort of cardboard) with a camera back that was simply pushed on and pulled off like a box lid. It sold for a dollar in the USA and was loaded with a six-exposure film cartridge.

Brownie box cameras became available in a number of sizes and the No.2, launched in 1901, also introduced the world to 120 rollfilm. The basic design stayed in production until 1933 and Kodak used the Brownie name on box cameras up until the mid-1950s. Incidentally, Brownies were "imaginary little sprites" created by a popular Canadian illustrator called Palmer Cox, and Kodak used them in its promotional materials to market the cameras to children. In the period of about a year, just under 250,000 Brownies were sold... popular photography was a reality.

4 Kodak DC20 (1996)

It's probably not too much of a stretch to describe the DC20 as the digital equivalent of Kodak's original box camera. It wasn't 'a first' in the sense of its constituent parts or

technologies, but nobody had put them all together in quite this way before. And it wasn't totally resolved as a consumer product either, but it still pointed very clearly to the way ahead. So the DC20 was gob-smackingly small, retained point-and-shoot simplicity and was more affordable than any digital camera seen so far. There was still a way to go, but the world would never be the same again. And, as with its first box cameras, Kodak wasted no time rolling out the refinements so it wasn't long before the DC25 arrived, adding everything that had been missing from the DC20 (flash, LCD monitor screen and memory card slot) and establishing the blueprint for a digital fixed-lens compact camera.



It's worth noting here that Kodak was a leader in every major category of digital camera – compact, D-SLR and medium format capture back – yet mostly failed to go on with its developments. So the company's current financial difficulties can't really be blamed on it supposedly being overtaken by the digital imaging technologies. At one stage, Kodak was *the* digital imaging company only those in charge at the time just didn't know it and axed vital programs rather than steering them to future profitability.

3 Asahi Pentax (1957)



The debate about who was first with the definitive 35mm SLR will never be resolved to everybody's satisfaction, but the reality is that Asahi Optical – which eventually became Pentax – made a lot of the early running and managed to get a lot of what it created beyond the prototype stage and into production. With the Asahiflex models of the early-to-mid 1950s it gradually refined the 35mm SLR to the point where it had a compact metal body, an instant-return mirror, a useful range of shutter speeds

delivered via a focal plane shutter, a hinged camera back (rather than being fully detached) and, of course, interchangeable lenses. All the Asahiflex models had a waistlevel reflex viewfinder which delivered a reversed image so alongside was a simple Galilean-type eyelevel viewfinder. It may look obvious now, but the next step must have kept the Asahi Optical engineers up at night as they contemplated ways around the cumbersome viewfinder arrangement and sought to make their 35mm SLR more user-friendly. When it appeared in May 1957, the Asahi Pentax didn't just have a radical new pentaprism-based eyelevel viewfinder with a Fresnel-type focusing screen, but also a 'rapid' single-stroke film advance lever and a film rewind crank. Here, then, was the basic template for the modern 35mm SLR. Built-in TTL metering, auto exposure control, a motorised film transport and autofocus were all in the future, but the Asahi Pentax represented the moment in SLR camera evolution comparable to humans standing upright.

Subsequent refinements included a microprism rangefinder (to assist with more accurate focusing), semi-automatic control of the lens diaphragm (from the camera body... which was a new idea), unification of the shutter speed dials, depth-of-field preview, a self-timer, a top shutter speed of 1/1000 second, a self-zeroing frame counter and various improvements to make changing films faster and easier. By the time the SV model was launched in July 1962, everything was in place for the next step forward which would come two years later with the launch of the Spotmatic line, but even this wouldn't be nearly as momentous as the first Pentax.

2 Nikon F (1959)



The F wasn't just Nikon's first SLR, it was at the heart of the world's first 35mm SLR *system* specifically designed for professional users. As such it was the first 35mm SLR with the option of motorising the film transport, the first with a viewfinder giving 100 percent subject coverage and the first with a line-up of interchangeable lenses that spanned 21mm to 1000mm. Before the Nikon F, professionals had been mostly using Rolleiflex TLRs, Leica rangefinder cameras or struggling with large format equipment and sheet film. The highly flexible, capable and efficient F changed everything and professionals switched to Nikon and its new

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35mm SLR in their legions. It also significantly lifted the image of Japanese cameras overall. The Nikon F was ahead of its time in many other areas too, including a titanium shutter with a top speed of 1/1000 second (although the earliest pre-production models had cloth blinds), interchangeable focusing screens and finders (which would lead to versions with built-in metering), and a diecast all-metal construction much stronger than anything that had been seen before.

Estimates vary, but Nikon subsequently built over 860,000 Fs in many variants and the camera remained in production until 1974 by which time its status as an iconic design – and one of the most important in photographic history – was guaranteed. It would be 13 years before anybody came up with a competitive system, by which time Nikon was ready to counter with its even more capable F2.

1 Leica M3 (1954)



After its launch in 1925, Leitz's revolutionary 35mm compact rangefinder camera delivered new creative possibilities derived from its unobtrusiveness, convenience and versatility which allowed greater spontaneity and responsiveness on the part of the photographer. Few other cameras have had quite such an impact on how photographs are seen and recorded, and there's little doubt the Leica greatly contributed to the 35mm format becoming the most successful and popular ever. A string of legendary names in photography adopted the Leica camera, among them Alfred



Eisenstaedt, Robert Capa, André Kertész, Henri Cartier-Bresson, Robert Frank, William Klein, Werner Bischof, W. Eugene Smith and Ernst Haas. As a result of their efforts, the Leica rangefinder camera is inextricably linked with much of the visual documentation of world events since the early 1930s.

Through the 1930s and '40s there was a slow evolution of the original design – interchangeable lenses in 1930, a built-in coupled rangefinder in 1932 and extended shutter speed ranges in 1933 and 1935. Subsequent developments included flash synchronisation, a self-timer and a brightline viewfinder with automatic parallax correction, but the most significant change came in 1954 with the introduction of the M3. This model introduced a new body shape with the viewfinder and rangefinder fully integrated and also combined. The M3 also introduced a bayonet lens mount and brightline image frames which adjusted automatically for the 50mm, 90mm and 135mm lenses while a separate finder was attached for the 35mm lens. Every

35mm interchangeable-lens rangefinder camera since – and, by default, all Leica's digital models – are derived from the M3's configuration which had never been bettered. Indeed, many M3s are still being used by enthusiasts today and Leica essentially reprised the design with the current MP. The M3 took all the attributes of the original Leica and made them all better, particularly improving the handling and ease of operation. The subsequent M4 and M6 models became the staples of documentary and street photography, but really only added a few refinements and features to further enhance their usability. In terms of balancing purity of form and function with some of the most useful 'modern' facilities – most notably, TTL metering – the M6 is undoubtedly a very important camera in the scheme of things, but then its basic design – that of a pure instrument for photography – remained unchanged from that of the M3. Precision engineering, compactness, high-quality optics and the features needed to *make* pictures rather than simply take them are what have marked the Leica M3 out as the most significant camera design in the history of photography.

The Innovators

Which manufacturer has had the most influence on camera design and the way we take pictures today? The statistics don't lie. We've ranked all the companies with more than one entry in our top 50 according to the number of entries and then where each of these cameras is placed between one and 50 to arrive at an overall ranking.

SIX ENTRIES



1. CANON – EOS 300D (#7), AE-1 (#17), EOS D30 (#23), A-1 (#31), T90 (#36), ELPH (#41)

2. PENTAX – Asahi Pentax (#3), Spotmatic (#9), ES (#32), Zoom 70 (#35), ME-F (#47), Auto 110 (#50)

FIVE ENTRIES

3. KODAK – DC20 (#4), The Kodak (#5), DCS 100 (#6), Instamatic (#14), VPK (#30)

4. OLYMPUS – OM-1 (#10), Digital Pen E-P1 (#21), Pen (#25), XA (#34), Pen F (#44).

THREE ENTRIES

5. NIKON – F (#3), F3AF (#24), Nikonos (#29)

6. ROLLEI – Rolleiflex TLR (#13), SLX (#19), 35 (#40)

7. MINOLTA – 7000 (#20) Hi-Matic 7 (#45), SR-T 101 (#46)

8. MAMIYA – RB67 (#31), M645 (#37), Mamiyaflex C (#48)

TWO ENTRIES

9. LEICA – M3 (#1), The Leica (#15)

10. POLAROID – SX-70 (#11), Model 95 (#27)

11. HASSELBLAD – 500C (#8), XPan (#43)

12. AGFA – Iso Rapid (#38), Optima (#42)

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THE HIGHLIGHTS

M.ZUIKO DIGITAL ED 8mm f1.8 PRO

- 16mm fish-eye (35mm format equivalent)
- World's fastest aperture of f1.8
- 17 elements (in 15 groups) optical construction which fully minimises comatic and chromatic aberrations
- Special elements optimise image quality, including high sharpness across the entire image field
- Olympus's 'ZERO' high-performance multi-coating to effectively reduce ghosting and flare
- A minimum focusing distance of just 2.5 centimetres
- Weather-proofed construction, including against sub-zero temperatures (down to -10 degrees Celsius)



THE NEW M.ZUIKO Digital ED 8mm f1.8 PRO is the world's fastest fish-eye with a 180 degrees angle-of-view so it's a whole lot more versatile than you might expect. We've sampled its expansive capabilities for astrophotography. If you think a fish-eye lens is just a bit too specialised, Olympus may just change your mind with its new 8mm f1.8 model. It's the latest addition to the PRO series of pro-grade lenses for the OM-D cameras (although it'll also fit any Digital Pen camera body as well), and it combines a remarkable 180 degrees angle-of-view with a fast maximum aperture of f1.8. In fact, right now, it's the world's fastest 180-degree fish-eye.

The ultra-wide angle-of-view is obviously ideal for astrophotography, enabling you to capture the full impact of an expansive night sky. The effective focal length is 16mm so this lens has an inherently large depth-of-field, ensuring any objects in the foreground of your image will be sharp as well as the sky. However, what's really important for astrophotography is that this focal length allows for much longer exposure times (up to 30 seconds, in fact) without the stars moving and starting to create light trails. In other words, even with fairly long exposure times, the stars remain spherical and perfect pinpoints of light.

Not surprisingly, this places considerable demands on the quality of the optics and Olympus has gone to great lengths to come up with a design that optimises both sharpness and brightness across the frame – quite a challenge with a 180-degree angle-of-view – but also minimises comatic and chromatic aberrations.

THE INSIDE STORY

The M.Zuiko Digital 8mm PRO lens is packed with state-of-art optical technologies... the 17-element construction includes Super ED

(extra-low dispersion), Super HR (high refractive index) and aspherical types which combine to provide uniform centre-to-corner sharpness and negligible vignetting.

Additionally, this lens has Olympus's ZERO (Zuiko Extra-low Reflection Optical) multi-coating to effectively counter both ghosting and flare. Thanks to its exceptional optical performance, this is a fish-eye lens with a great many more applications than would normally be the case... including, for example, underwater photography (where the expansive angle-of-view again creates visual impact and the wide aperture allows for faster shutter speeds) and landscape photography for truly 'big' views. An optional underwater lens port is available for using this lens on OM-D camera bodies. A minimum focusing distance of just 2.5 centimetres means that you can even use this lens for some spectacular macro photography, using the exaggerated perspective for dramatic effect.

Olympus has even thought about the environments in which this lens is likely to be used, so its design is fully weatherproofed to prevent the intrusion of dust or moisture while also enabling you to keep on shooting in temperatures as low as -10 degrees Celsius (with either the OM-D E-M1 or E-M5 Mark II). This sealing means condensation forming inside the lens just isn't an issue when shooting on a cold night.

Compared to many other fish-eye lenses too, the Olympus 8mm f1.8 PRO is very compact, measuring just in 80 millimetres length (including its built-in hood) and weighing only 315 grams... so you don't need a super heavyweight tripod when taking longer exposures at night. And, of course, the fast aperture of f1.8 means you can leave the tripod at home on more occasions, especially with the sophisticated five-axis image stabilisation that's available in both the E-M1 and E-M5 II.

A unique combination of useful capabilities and high optical performance makes the M.Zuiko Digital ED 8mm f1.8 PRO a remarkable lens which has the potential to open up a whole new world of photography, bringing a dramatically different perspective to a variety of applications.

NIKON D7200



OLD DOG, NEW TRICKS

If you're a bit envious of what Nikon is offering on its latest 'FX' format D-SLRs, but you're a committed 'DX' user, you'll be pleased to know that the D7200 closes the gap, ensuring the smaller-sized sensor remains an attractive proposition.

While full-35mm D-SLRs have been making headlines recently, there are still plenty of good reasons for going with an 'APS-C' size sensor instead. In the Nikon world, this is the 'DX' format and for a little while there it looked like it might be becoming the poor cousin as the company launched a steady stream of shiny new 'FX' format models. But, in quick succession, Nikon has launched the D5500 – currently the world's most compact D-SLR – and the D7200 which, as the new 'DX' flagship, gives aficionados of the smaller format some serious fire power comparable to the likes of the D610 or even the D750.

The D7200 takes over the 'DX' flagship mantle from the D7100 and, in comparison, it has a different sensor, Nikon's current-generation 'Expeed 4' processor, a much bigger buffer memory, an upgraded autofocus

system, enhanced video recording capabilities and a variety of new features, including WiFi connectivity. Importantly, all this is designed to keep Nikon in the hunt against the Mark II version of Canon's EOS 7D.

While certainly not bulky, the D7200 isn't especially compact either – in fact, the D750 is only marginally bigger – but, as always, Nikon's emphasis is on comfortable handling and efficient ergonomics. Consequently, there's a good-sized handgrip and the control layout follows the current formula for higher-end Nikon D-SLRs and so is based on a main mode dial with front and rear input wheels, plus a multi-directional controller located on the rear panel. The monitor screen is fixed, but it's a nicely contrasty RGBW panel with a resolution of 1.299 million dots. It's supplemented by a monochrome info display on the camera's top panel which has built-in illumination. The top and bottom body covers are magnesium alloy (so is the chassis) while the rest are GRP, and all joints and junctions are sealed against dust or moisture. The D7200 has a built-in flash and a hotshoe (but no PC terminal) and it uses the same

EN-EL15 lithium-ion battery pack as a number of other Nikon D-SLRs, (including the D610 and D750). An optional battery grip is available which replicates the key controls for easier shooting when the camera is being held vertically.

There are two memory card slots, both for the SD format with support for the higher-capacity HC and XC versions plus UHS-I high speed transfer, but not the faster UHS-II type. The slots can be configured in a variety of ways to allow automatic switch over when one is full ('Overflow'),

simultaneous recording to both cards ('Back Up') or the separate recording of RAW and JPEG files (and this can also be done for still images and movie clips).

The viewfinder is a full pentaprism design, giving 100 percent scene coverage with 0.94x magnification. An OLED display allows for the superimposition of various warnings and notifications, including dual-axis level indicators, plus there's a switchable grid guide. Like the D750, the D7200 has a redesigned monitor-based information display,

but it's still simply a passive display rather than an active control panel. However, the customisable but clunky 'Shooting Menu Bank' and 'Custom Setting Bank' are gone, replaced by a simpler and easier-to-use ten-item menu which includes, among other things, the 'Picture Control' presets, the 'Active D-Lighting' settings and HDR mode. It's definitely an improvement, but if you want to change things like the ISO or white balance on-the-fly, you still have to do it the old-fashioned way via a dedicated function button.



**THE D7200
MOVES UP TO
NIKON'S LATEST-
SPEC 'EXPEED 4'
PROCESSOR WHICH
NO DOUBT MAKES
A CONTRIBUTION
TO THE INCREASED
SENSITIVITY RANGE
VIA SUPERIOR
NOISE REDUCTION
PROCESSING.**



'Quiet' mode is only available for single-frame shooting.

Rear panel layout is also 'old school' and centres around the multi-directional 'Multi Selector'. The fixed LCD monitor screen has a resolution of 1.229 million dots and is an RGBW display.



Rear panel buttons have dual roles in the camera's shooting and replay modes.

Main information display can be manually set to black-on-white or the reverse, or to switch between the two automatically depending on the ambient light levels.

Dual slots are provided for SD format memory cards and the file management includes simultaneous recording of images to both or the splitting of JPEGs and RAWs.

effective lens focal length – up to 2.8x – while the maximum resolution is still pretty good at 15.3 MP which may be an acceptable trade-off for anybody who needs some instant extra telephoto power.

As on all Nikon D-SLRs, JPEGs can be recorded at one of three sizes with a choice of three compression levels and the option to set this compression to 'Size Priority' or 'Optimal Quality'. RAW files can be captured at either 12-bits or 14-bits colour depth with lossless compression or lossy compression, but in only one size. The RAW+JPEG capture can be configured to append a large JPEG with the choice of Basic, Normal or Fine compression.

Following the D810 and D750, the D7200 has an additional 'Picture Control' preset called Flat which is primarily designed for use with video recording and maximises the dynamic range, leaving everything else for adjustment post-camera (i.e. via colour and exposure grading). Obviously, though, it can still be used for still photography if you prefer to work on your JPEGs later.

Additionally, all the 'Picture Control' presets have the new Clarity adjustment parameter which varies the contrast of mid-tones to help enhance overall detailing. The colour presets also have adjustments for sharpness, contrast, brightness, saturation and hue while the Monochrome 'Picture Control' replaces the latter two with a set of B&W contrast filters (yellow, orange, red and green) and a selection of toning effects (nine colours, each with seven steps of density). There's a 'Quick Adjust' option which applies a number of tweaks collectively or, alternatively, 'Auto' adjustment can be applied and this works according to the exposure and also the position of the subject in the frame. Up to nine modified 'Picture Controls' can be stored and given a new title up to 19 characters in length.

TAKING EFFECT

The D7200 has a small selection of 'Special Effects' settings which can be applied at the point of capture, but these are essentially 'standalone' modes – accessed via the main mode dial – so there



LIKE THE D750, THE D7200 USES THE NEW MARK II VERSION OF NIKON'S 51-POINT 'MULTI-CAM 3500FX' AUTOFOCUS MODULE WHICH PRIMARILY OFFERS AN EXTENDED LOW LIGHT SENSITIVITY DOWN TO EV -3.0 (AT ISO 100).

HIGH-POWERED PIXELS

While the D7200's sensor has very similar specifications to the device used in the D7100 – including a maximum image size of 6000x4000 pixels – it is apparently different as evidenced by its total pixel count of 24.72 million (24.2 MP effective) and an expanded, by two stops, native sensitivity range equivalent to ISO 100 to 25,600. There are actually two further high ISO settings – i.e. 51,200 and 102,400 – but Nikon has wisely restricted these to B&W capture only, thereby eliminating any chroma noise issues.

As before, this CMOS-type sensor doesn't have an optical low-pass (or anti-aliasing) filter in order to optimize its resolution potential.

The D7200 moves up to Nikon's latest-spec 'Expeed 4' processor which no doubt makes a contribution to the increased sensitivity range via superior noise reduction processing. As noted earlier, there's also a bigger



buffer memory so the quoted burst lengths have improved quite significantly – up to 100 maximum quality JPEGs, 27 12-bit RGB RAW files or 18 14-bit RAW files. If you opt for captured compressed RAW files (which are marginally smaller in size), the burst lengths are 35 and 26 frames respectively. The maximum continuous shooting speed remains at 6.0 fps, but there's the option of a '1.3x' cropped image mode – representing an imaging area of 18x11 mm – which allows for a slightly quicker maximum shooting speed of 7.0 fps. This obviously gives a further increase in the

are no manual controls (not even exposure compensation) and even the ISO is adjusted automatically.

Probably more useful, then, are the choice of effects available as post-capture editing functions in the camera's Retouch Menu and which include 'Fish-Eye', 'Colour Outline', 'Colour Sketch', 'Miniature Effect' and 'Select Colour'.

Like most of its siblings, the D7200 has a multi-shot HDR capture function or, alternatively, the dynamic range can be expanded via Nikon's 'Active D-Lighting' (ADL) processing. Auto bracketing is available for the ADL corrections and can be set to sequences of two, three, four or five frames (which covers all the possible setting options of Off, Low, Normal, High and Extra High). There's also a multiple exposure facility and a 9999-frame intervalometer with an exposure smoothing function (which avoids excessive brightness variations between frames). In-camera corrections are provided

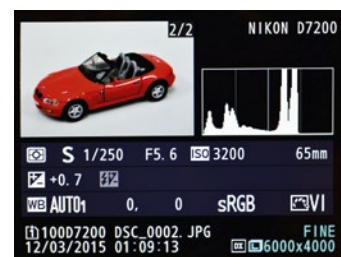
for lens vignetting and distortion plus noise reduction for both long exposures and shooting at high ISOs (the latter with the choice of Low, Normal or High settings). As on all Nikon's higher-end D-SLRs, correction for lateral chromatic aberrations is performed automatically with JPEG capture.

POINT DUTY

Like the D750, the D7200 uses the new Mark II version of Nikon's 51-point 'Multi-CAM 3500FX' autofocus module which primarily offers an extended low light sensitivity down to EV -3.0 (at ISO 100). In the smaller format camera, the spread of 51 points offers greater scene coverage and the 15 central points – arranged in three columns of five – are cross-type arrays which remain functional with lenses as slow as f5.6. A total of 11 points, including the centre-most cross-type array, work with lenses as slow as f8.0 primarily to accommodate telephotos being used with a teleconverter.

Switching between single-shot and continuous AF operation can be done manually or left to the camera, and there's the choice of using single-point AF or one of three 'Dynamic Area' auto modes – for nine, 21 or all 51 points – to progressively increase the coverage if a subject moves away from the selected focus point. Additionally, there are '3D Tracking' and 'Auto Area' modes for auto AF point selection, but the D7200 doesn't have the 'Group Area' mode found on the latest 'FX' format Nikon D-SLRs. A body-based autofocus motor is retained so non-AF-S Nikkor lenses can be used. In live view and when shooting video, autofocus is via the contrast-detection method only.

Exposure control is based on the same 2016-pixels '3D Colour Matrix II' system used in the D7100 (and also, incidentally, the D610) so it's not Nikon's top-spec system, but still quite capable. It integrates with the AF system to



Review screen options include (from top) employed focus points, a thumbnail with either RGB histograms or with capture data and a brightness histogram, and full capture data overlays.

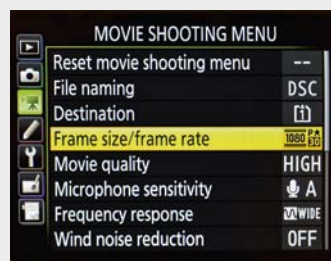
enable what Nikon calls "Scene Recognition" analysis based on known image patterns in order to improve overall accuracy.

The 'Matrix' multi-zone metering is supplemented by centre-weighted average and spot measurements, the latter on a 3.5 mm diameter circle representing 2.5 percent of the total frame area. It can be set to coincide with the active focusing point. The averaging meter's centre-weighted area – to which is applied a 75:25 bias – can be varied in diameter (6.0 mm, 8.0 mm – the default setting – 10.0 mm or 13.0 mm).

The standard set of 'PASM' exposure control modes is supplemented by 16 subject modes. There's the usual complement



Nikon isn't holding back when it comes to equipping its D-SLRs for video work so the D7200 carries on from where the D7100 left off. The later-generation 'Expeed 4' processor allows for Full HD resolution recording at 30, 25 or 24 fps with progressive scanning, plus at 60 or 50 fps if you switch to the '1.3x' crop mode. With the 1080/50p recording, the



Movie menu has been revised to reflect the D7200's increased video-shooting capabilities.

maximum bit rate is 42 Mbps. However, the maximum recording duration is just ten minutes. As before, there's also the option of selecting between High and Normal quality modes which give bit rates of 24 Mbps and 12 Mbps respectively.

As is common across the range, the D7200 records in the MOV format using MPEG-4 AVC/H.264 compression, but a 'clean' and uncompressed FHD video feed (8-bit, 4:2:2: colour) is available from the HDMI connector.

Stereo microphones are built-in and the camera has both a stereo audio input and a stereo output for connecting headphones. The D7200 also has the additional audio controls found on models such as the D750 and D810, namely levels adjustment over 20 steps, 'Wide' and 'Vocal' frequency response settings and a switchable low-cut (or wind) filter. In movie mode, the 'i' button provides direct access to all these audio adjustments, as well as the image quality

settings and frame rates, and the 'Picture Control' presets. Also selectable from here is a zebra pattern generator which is a less intrusive method of showing where the blown-out lights are when shooting video.

Continuous autofocus is available during video recording, but the exposure must be preset and the only adjustment available is exposure compensation. However, the D7200 does allow for auto ISO control with the manual exposure mode so a desired aperture can be maintained in changing light levels. Unfortunately, though, this model doesn't have the very handy 'Power Aperture' control that's provided on the likes of the D750 and D810.

You probably aren't going to rush out and buy the D7200 specifically as a video camera, but if you want to shoot video with your D-SLR, it's pretty well got everything you're likely to want and does a good job into the bargain.

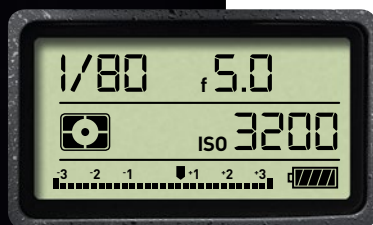
img_2445.jpg@100%(RGB/8#)



Test images captured as JPEG/large/fine files with the AF-S Nikkor 18-105mm f3.5-5.6G ED zoom or Sigma 14mm f2.8 EX. Fine details are clearly resolved and the dynamic range is extremely good without the need for any expansion processing. Noise levels are very low up to ISO 800 and acceptable at ISO 1600

100% Doc: 2.8mb

This image was captured at ISO 3200 with the camera hand-held. There's some softening of details, but otherwise colour (chroma) noise is very well suppressed. The exposure was 1/80 second at f5.0 with +0.7 EV compensation and using the Vivid 'Picture Control' preset. The AF functioned reliably despite the very low light levels.



of facilities for fine-tuning exposures, including program shift, auto bracketing, an AE lock and up to +/-5.0 EV of compensation applied in one-third, one-half or full stop

increments. The exposure bracketing sequences can be up to nine frames with adjustments in one-third, two-thirds, one, two or three stop increments (but with the last two, the maximum sequence is five frames).

Usefully, the exposure bracketing can be combined with flash bracketing. The shutter has a speed range of 30-1/8000 second (with flash sync up to 1/1250 second) and is tested to 150,000 cycles.

LIGHT AND WHITE

The D7200's built-in flash has a metric guide number of 12 (at ISO 100) and it uses Nikon's i-TTL control system, based on the 2016-pixels metering sensor and emitting a series of nearly-imperceptible preflashes to determine the exposure, including balanced fill-in. The other modes include red-eye reduction, slow speed sync and the option of switching to second curtain sync. In addition to the bracketing function, flash compensation can be set over a range of -3.0 to +1.0 EV and there's also a flash output lock. In manual mode, the power output can be wound down to 1/128. As is now pretty well standard across the Nikon D-SLR line-up (except, obviously, for the D4S), the built-in flash can serve as the commander unit for a wireless TTL flash set-up.

White balance control also relies on the 2016-pixels RGB metering sensor. The standard automatic correction has a range of 3500 to 8000 degrees Kelvin, but there's the option of a 'Keep warm lighting colours' or 'Auto 2' setting which is designed to maintain warmer tones when shooting under incandescent lighting. There are 12 presets, including seven for the various different types of gas-ignition lamps ranging from sodium-vapour at 2700 degrees Kelvin to mercury-vapour at 7200 degrees Kelvin.

Fine-tuning of all the presets is possible in five-mired increments across the green-to-magenta and blue-to-amber colour ranges. Alternatively, the colour temperature can be set manually from 2500 to 10,000 degrees Kelvin with the option of adjustments in extremely fine ten-degree increments or in mireds (separately



As on all Nikon D-SLRs, the menu system is very logically arranged and easy to navigate.



New Flat 'Picture Control' preset (bottom) is designed to optimise the dynamic range when shooting video or for JPEG capture.



Live view screen displays include a grid guide (top) and a level indicator, but a real-time histogram is only available when shooting video.

for the green-to-magenta and blue-to-amber colour ranges). White balance bracketing can be in one-, five- or ten-mired increments and over two, three, five, seven or nine frames. A total of six custom white balance measurements can be measured and stored for future recall.

ON THE MENU

The D7200 also sticks to the standard Nikon script in terms of its menu system and display options. As always, the menus are well organised and easy to navigate via a series of progressive 'right clicks' which takes

you from the chapter tabs through to actual settings. The Custom Setting Menu remains the best in the business, logically organised into sections relating to particular areas of operation... i.e. Autofocus, Metering/Exposure, Timers/AE Lock, Shooting/Display and so on. You simply can't go wrong and everything is where you'd expect it to be.

We've already mentioned the viewfinder displays which include dual-axis level indicators which are also available in the live view screen, except in the form of a much more elaborate multi-colour 'Virtual Horizon' graphic. The LV screen can also be configured with a guide grid, but there isn't the option of having a real-time histogram here, although curiously this is available in the movie mode. Pressing the 'i' button brings up a selection of functions which can be directly accessed for adjustment, including the 'Picture Control' presets, image quality settings and the 'Active D-Lighting' correction.

As usual on a Nikon D-SLR, the image review screens can be expanded – via a checklist in the Playback Menu – to cycle through a variety of displays, including a thumbnail with a full set of brightness and RGB histograms, an image overlaid with the focus point(s) employed, and three pages of image data which increases if copyright details are included and/or the optional GPS receiver is fitted. The highlight warning can be cycled through the RGB channels separately. The playback options include 4/9/72 thumbnail displays, zooming up to 38x and a slide show with variable image display times.

As noted earlier, the camera's Retouch Menu includes a variety of

special effects and, again, can be quickly accessed via the 'i' button. Also here is 'D-Lighting' correction for post-capture dynamic range expansion, conversion to B&W (with the additional choices of either sepia or cyanotype toning), distortion control (with auto or manual correction), and RAW-to-JPEG conversion. There's also a 'Quick Retouch' setting which automatically boosts the saturation and contrast according to the selection of 'Low', 'Normal' and 'High' settings.

The main mode dial is lockable and provides access to the D7200's small set of at-capture special effects.

The selector at the base of the lens mount switches between AF and MF operation while the button in its centre allows for the selection of the various AF area modes.



The connection bay includes both a stereo audio input and output. An uncompressed video feed is available from the HDMI terminal.

The WiFi module offers the convenience of NFC 'touch and go' connectivity for Android devices... the location of the antenna is indicated by a small NFC logo on the handgrip. Nikon's Wireless Mobile Utility app then allows for image browsing and uploading, but is fairly limited in the way of remote camera controllability.

SPEED AND PERFORMANCE

With our Lexar Professional 64 GB SDXC 600x reference memory card loaded, the D7200 captured a sequence of 34 JPEG/large/fine frames in 5.515 seconds which represents a shooting speed of 6.16 fps. This is slightly better than the quoted maximum speed and, additionally, the test files were around 18.7 MB in size while Nikon bases its figures on an average of just 12.7 MB.

The D7100's autofocus was already fast and reliable and that obviously hasn't changed with the D7200, but there's a discernible improvement in the low light performance – especially in terms of responsiveness – and assisted

ON THE FACE OF IT, THE D7200 DOESN'T LOOK LIKE MUCH OF AN UPGRADE OVER THE D7100, BUT DELVE A BIT DEEPER AND IT'S EVIDENT THAT QUITE A LOT HAS CHANGED.



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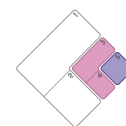
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by the exceptionally wide coverage of fully functioning points.

Although, it's the earlier-spec '3D Colour Matrix II' metering, it's still exceptionally reliable in most situations, including when there's a wide contrast range within the frame.

There's plenty of competition in this class of sensor size and price, including both D-SLRs and CSCs, but Nikon is clearly determined to stay at the top with its 'APS-C' flagship. The best-quality JPEGs exhibit plenty of crisply-defined detailing and beautifully smooth tonal gradations. Minus an OPLF, the sensor delivers an unadulterated 24.2 MP so the reproduction of really fine textures is handled with consummate ease.

The colour fidelity is excellent across the spectrum with good neutrality when using the Standard

'Picture Control' preset, but if you like a bit of extra 'punch' it's hard to go past the Vivid preset which delivers some extra saturation and contrast, but doesn't overdo it.

In terms of noise levels, the D7200 performs extremely well up to ISO 800 and even at ISO 1600 and 3200 the image quality is still good, although the latter exhibits some reduction in both sharpness and saturation. The ISO 6400 setting is usable too, but things start to look progressively more ragged at ISO 12,800 and 25,600 so it's not surprising that the two expansion settings are for B&W capture only.

Particularly notable is the D7200's wider dynamic range (discernibly improved over the D7100) which can be better exploited with the new Flat 'Picture Control' preset. Using

the ADL processing further increases the tonality into the brighter highlights without compromising the deeper shadows.

THE VERDICT

On the face of it, the D7200 doesn't look like very much of an upgrade over the D7100, but delve a bit deeper and it's evident that quite a lot has changed, both for still photography and for shooting video.

Given the D7100 was – and still is – a very competent and capable camera, the D7200 goes further, making it a very desirable package indeed... just as well given the actual competition is much stiffer now, especially from the mirrorless designs.

As we've noted with most of Nikon's recent D-SLRs, the D7200 is determinedly 'old school' in terms of its design and operation

which is becoming an increasingly marked point-of-difference with its mirrorless rivals sporting features such as touch screens and pixel shifting. However, while maintaining its clear appeal to D-SLR traditionalists, Nikon has kept the D7200 well in the hunt with its increased video functionality, WiFi connectivity and a myriad of little tweaks to various features and their settings to expand its overall capabilities. Consequently, the D7100 now really has more in common with the likes of the 'FX' format D610 than any of its 'DX' siblings which is good news for anybody with a system of the smaller format lenses.

Just how long Nikon can keep its 'business as usual' approach to new D-SLR designs is debatable, but right now the D7200 ticks a lot of boxes. 📷



VITAL STATISTICS

NIKON D7200 \$1449 body only, estimated average street price

Type: Enthusiast-level digital SLR with Nikon F (D-type) bayonet lens mount

Focusing: Automatic via 51-point wide-area system using phase-detection type CCD sensor with 15 cross-type arrays. Focus points may be selected manually or automatically and either as single points or in groups (9/21/51). Points re-orientated for vertical shooting. One-shot and continuous modes both with a predictive function. 3D Tracking mode. Sensitivity range is EV -3 - 19 (ISO 100). AF assist provided by built-in illuminator. AF micro-adjustment for individual lenses (up to 20). Contrast-detection AF in live view and video modes.

Metering: 2016 pixels RGB '3D Color Matrix II', centre-weighted average (with variable diameter weighting – 6.0mm, 10mm or 13mm), spot (3.5mm/2.5%), highlight-weighted, and i-TTL flash via 2016-pixels sensor. Metering ranges are; 3D Color Matrix and C/W average = EV 0 to 20; spot = EV 2 to 20 (f1.4/ISO 100). **Exposure Modes:** Continuously-variable program with shift, shutter-priority auto, aperture-priority auto, metered manual, i-TTL auto flash and manual flash. 16 subject/scene modes.

Shutter: Electronically-controlled, vertical travel, focal plane type, 30-1/8000 second plus 'B'. Flash sync up to 1/250 second. Exposure compensation up to +/-5.0 EV in 1/3 or 1/2 stop increments.

Viewfinder: Coverage = 100% vertical/horizontal. Magnification = 0.94x (50mm lens at infinity). OLED displays and LED focus point indicators. Standard focusing screen has AF zones and on-demand grid lines. Eyepiece strength adjustment provided.

Flash: Built-in pop-up unit with GN 12 power (ISO 100). Auto, fill-in, red-eye reduction, front/rear sync and slow speed sync modes. Commander mode for wireless TTL control of compatible external flash units. External flash units connect via hotshoe. Flash compensation range of -3.0 to +1.0 EV in 1/3 or 1/2 stop

increments and flash bracketing (up to three frames). Manual control down to 1/128 of full power.

Additional Features: Magnesium alloy and polycarbonate bodyshell sealed against dust and moisture, auto exposure bracketing (over two, three, five, seven or nine frames) AE+flash bracketing, depth-of-field preview, AE lock, exposure adjustments in either 1/3 or 1/2 stop increments, variable delay and multi-shot self-timer (two to 20 seconds, up to nine frames, 0.5-3.0 seconds intervals), mirror lock-up, quiet shutter mode, audible signals, wired remote control terminal, wireless remote control, 53 custom functions.

DIGITAL SECTION

Sensor: 24.2 million pixels CMOS with 23.5x15.6 mm area. Sensitivity equivalent to ISO 100-25,600 (extendable to ISO 51,200 and 102,400, but for B&W capture only). No optical low-pass filter (OLPF).

Focal Length Increase: 1.5x.

Formats/Resolution: Three JPEG compression settings (1:4, 1:8 and 1:16), and lossless compressed, compressed or uncompressed RAW files. Three resolution settings at 3:2 aspect ratio; 6000x4000, 4496x3000 and 2992x2000 pixels. Three resolution settings in '1.3x' format (18x12 mm); 4800x3200, 3600x2400 and 2400x1600 pixels. Additionally, still images can be captured in the movie mode in the 'DX' and '1.3x' formats and the 16:9 aspect ratio, again at three resolution settings. RAW (NEF) images are captured at 6000x4000 pixels, in either 36-bit or 42-bit RGB colour, and either lossless compressed or compressed. RAW+JPEG capture is possible (with all JPEG compression levels).

Video Recording: Full HD = 1920x1080 pixels at 50, 25 or 24 fps (PAL, progressive) and 16:9 aspect ratio. HD = 1280x720 pixels at 50 fps (PAL, progressive) and 16:9 aspect ratio. MPEG 4 AVC/H.264 compression. Stereo sound

recording with auto/manual adjustable levels. Stereo microphone input and headphone output provided. Clip duration limited to 20 minutes at normal quality (1080/50p, 24 Mbps), up to 10 minutes at high quality (1080/50p, 42 Mbps). File size limit is 4.0 GB.

Video Features: Index marking, zebra pattern, time lapse recording, auto flicker detection, uncompressed 8-bit RAW data output via HDMI connection (with simultaneous recording to a memory card).

Recording Media: Two slots for SD/SDHC/SDXC (UHS-I compliant) memory cards. Overflow, Backup and RAW Primary-JPEG Secondary file management modes.

Continuous Shooting: Up to 100 frames at 6.0 fps in JPEG/large/fine mode, up to 18 frames in RAW mode (14-bit, lossless compressed). Low speed continuous shooting mode can be set from 1.0 to 6.0 fps. Continuous shooting at 7.0 fps in '1.3x' mode.

White Balance: TTL measurements using the 2016-pixels RGB metering sensor. Auto/manual control with 12 presets and six custom settings. White balance fine-tuning available for AWB and all presets plus manual colour temperature setting (2500-10,000 degrees Kelvin) and white balance bracketing (up to three frames). Warm AWB setting maintains a warmer hue under incandescent lighting.

Interfaces: USB 2.0, HDMI output (Type C), 3.5mm stereo audio input, 3.5mm stereo audio output, accessory terminal.

Additional Digital Features: Active sensor cleaning, dual-axis 'virtual horizon' display, live view functions (with contrast-detection AF), 8.1 cm LCD monitor (1.299 megadots resolution), 'Active D-Lighting' contrast control (Auto, Low, Normal, High, Extra High), ADL bracketing (up to five frames), seven 'Picture Control' presets (Standard, Neutral, Vivid, Monochrome, Portrait, Landscape, Flat), adjustable 'Picture Control' parameters (Sharpening, Clarity, Contrast, Brightness, Saturation, Hue), B&W filters and toning effects, nine

user-defined 'Picture Control' modes, seven at-capture special effects (Night Vision, Colour Sketch, Miniature, Selective Colour, Silhouette, High Key, Low Key), multiple exposure facility (up to three frames with Auto Gain), intervalometer (with exposure smoothing), HDR dual-shot capture (Auto, Extra High, High, Normal, Low), sRGB and Adobe RGB colour spaces, long exposure noise reduction (Off, On), high ISO noise reduction (Off, Low, Normal, High), auto ISO with auto minimum shutter speed control, lens distortion correction (Speed, On), lens vignetting correction (Off, Low, Normal, High), real-time histogram (in live view), image comments input (up to 36 characters), auto image orientation, adjustable image display time, slide show, brightness and RGB histograms, highlight alert, 4/9/72 thumbnail displays, calendar thumbnail display, playback zoom (up to 38x in 'DX' format), 'Retouch Menu' for in-camera editing (D-Lighting, Red-Eye Correction, Trim, Monochrome, Filter Effects, Colour Balance, Image Overlay, RAW Processing, Resize, Quick Retouch, Straighten, Distortion Control, Fish-Eye, Colour Outline, Colour Sketch, Perspective Control, Miniature Effect, Selective Colour, Edit Movie, Side-By-Side Comparison), built-in WiFi with NFC connectivity. May be fitted with optional GP-1 or GP-1A GPS receivers. PictBridge and DPOF support.

Power: One 7.0 volt, 1900 mAh rechargeable lithium-ion battery pack (EN-EL15 type).

Optional MB-D15 battery grip accepts one EN-EL15 li-ion pack or six AA-size batteries (alkaline, NiMH or lithium).

Dimensions (WxHxD): Body only = 135.5x106.5x76.0 mm.

Weight: Body only = 675 grams (without battery pack or memory card).

Price: Body only = \$1449, estimated average street price.

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The Picture

Tauranga Bay is located south of Westport on the west coast of New Zealand's South Island. It is a popular tourist destination featuring a coastal walk and views overlooking a seal colony. Late in the afternoon, most of the visitors have left (there is no accommodation in the immediate area) and the beach is usually deserted. If you know the area well enough, a combination of

low tide and a little cloud can produce some spectacular sunsets using reflections.

The Photographer

Writer and photographer Trevern Dawes has the rare distinction of being a contributor to the very first issue of this magazine when it was launched back in June 1979. He is still as passionate about photography now as he was then, and continues to write about

many areas of image-making and taking pictures for both books and magazine articles.

The Equipment

Canon EOS 5D Mark II and general purpose 24-105mm zoom lens. No tripod was involved as it would be more restrictive than helpful on wet sand. The ISO was set at 400, with aperture-priority auto exposure control at f11 and manual focus at a mid-point. RAW file type.

The Technique

A bright, dominant sun can be too overwhelming so it's critical to hide the sun behind heavy cloud – or, in this case, the island – to allow the even spread of sky colour and its reflectance in the hard, wet sand. Photoshop treatment was required to remove the general flatness of a RAW digital file, yet at the same time, retain as much highlight and shadow as possible. This involves working with 'Image Adjustment



Curves' and some 'Burning & Dodging'. The image was cropped top and bottom to tighten the presentation.

How It Was Done

Sunset sequences at Tauranga Bay have always been part of Trevern's South Island itinerary. In fact, each journey is planned to be in locations to benefit from either a low or high tide. Thereafter it's in the hands of the photographic

gods to provide the appropriate weather. This time all the elements came together. Sunsets can vary in intensity and sometimes are at their best in the more subtle last moments, hence the need to stay until all the colour has gone.

Tricks Of The Trade

At low tide, the very flat and wide sand along the beach retains sufficient moisture to provide a near perfect reflective surface.

From the car park this is not evident, so the 'trick' is be aware and to be there when a decent sunset is imminent. Finding just the right spot means constantly moving about and getting down close to the sand rather than capturing everything from a standing position. The best way to avoiding your own foot prints is to walk along the beach and then go back a metre or so closer to the sea. Manual focus puts

you in control and the ISO of the camera is set high enough to allow adequate shutter speeds to arrest any camera movement.

Degree Of Difficulty (Out of 10)

There is no great difficulty in securing stunning shots in this location as it's simply a matter of being there in the right conditions. No high score on that account but the end result is deserving a '9' to allow sufficient scope to creep that little extra with an even better sky.

Can You Try This At Home?

On the southern headland of the beach there are several small houses or 'baches' (as they're called in New Zealand) where occupants can return after a photo session, but for the rest of us we need to be lucky and then head off in the dark to Westport.

Nevertheless, there can be wonderful events on the home front and all it takes is a camera close by and the capacity to work fast. 📸

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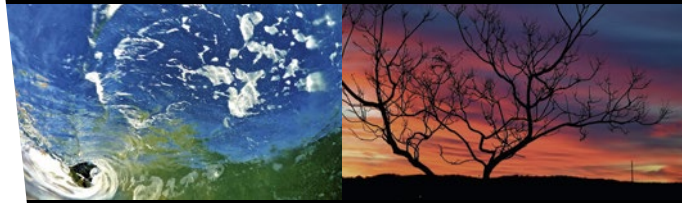
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AUSTRALIAN
TEENAGE
PHOTOGRAPHER
OF THE YEAR



THE HUNT IS ON FOR THE...

AUSTRALIAN TEENAGE PHOTOGRAPHER OF THE YEAR!

LIKE MOST CREATIVE endeavours, photography is a hard field to break into when you're just starting out. You need to show that you've got talent and abilities, but that's hard when nobody has seen what you can do. And because you're an unknown quantity, very few people – such as potential clients – will take the risk of hiring you over somebody with proven experience. It's the classic 'Catch 22' situation.

At *Camera* we know that there are a lot of talented young photographers out there who are good enough to perhaps one day turn their hobby into a profession, but where do you start? Publishing your own images online is one thing, but everybody is doing that and, unless your work is truly exceptional, it's very unlikely anybody will notice you. Being published in print is still the best way to get a toe in the door. It means that your images have been evaluated by professionals and judged good enough to get on the page.

So, over the next six issues of *Camera*, we're giving you the chance to do just that... have a portfolio of your images published over a double-page spread in

Australia's leading photography magazine. At the end of the competition, we'll also judge all six portfolios and crown somebody the Australian Teenage Photographer Of The Year. Our good friends at Canon Australia also like this idea, so they've given us an EOS 750D D-SLR with an EF-S 18-135mm f3.5-5.6 IS STM zoom lens – currently valued at \$1449 – to present as the grand prize. Furthermore, the overall winner will be presented with the inaugural Australian Teenage Photographer Of The Year trophy.

Of course, we can't guarantee you'll have a brilliant career in photography, but if you win one of the six rounds, you'll have a published portfolio to show off and, if you win the competition overall, you'll have some serious bragging rights. We'll also be showcasing your images on *Camera* magazine's website at www.avhub.com.au

Your submissions will be evaluated by *Camera* editor Paul Burrows and professional photographer Bruce Usher, who both have vast experience in evaluating the work of photographers, both beginners and the more experienced.

HERE'S HOW TO GET STARTED

One aspect of being a good photographer is being a good editor so, initially, we want you to select your SIX best images. These can be of any subject or on any theme, but they need to demonstrate your abilities with a camera... in other words, your eye for a great picture. We don't mind a bit of post-camera editing, but anything that's obviously over-manipulated won't make the cut.

Next, submit small JPEG versions of your top six – the file size doesn't need to be any bigger than 500 KB – via email to cameracomp@avhub.com.au. In the subject line of the email write Teenage Photography Competition and, in the body of the email, supply your name, age and a (very) brief outline of what you like to photograph and why.

If your submission is successful, we'll contact you to obtain bigger image files (and perhaps also a few more pictures) plus some additional information about who you are and what motivates you to take pictures.

The last publication for submissions will be the May/June 2016 issue of *Camera* magazine, so the closing date for the competition is 15 April 2016. You may enter each round, but you must submit a different portfolio of six images each time.

HERE ARE THE (SIMPLE) RULES

1. To be eligible to enter the Australian Teenage Photographer Of The Year competition you must be resident in Australia and aged between 13 and 19 as of 30 June 2015.
2. The closing date for final online submissions is 15 April 2016.
3. All submitted images must have been taken in the 12 months prior to you entering the competition.
4. You are permitted to use any type or brand of camera/lens.
5. You are permitted to enter any or all rounds, except that should you win a round, no further submissions are allowed. Each submission must feature a different set of six images.
6. Copyright remains with the photographer, but we retain the right to publish any submitted image in association with publicity or promotion of the Australian Teenage Photographer Of The Year competition.



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AUSTRALIAN TEENAGE PHOTOGRAPHER OF THE YEAR

William Sides

SYDNEY

SEEING WILLIAM'S WORK was the catalyst for the creation of Australian Teenage Photographer Of The Year. He submitted a portfolio of images on the off-chance we might be interested – we were! But it also got us thinking about how many other talented young photographers might be out there, looking for somewhere to show off their pictures.

William was born in London in March 2001. He moved to Australia with his family in 2010 and lives on Sydney's northern beaches where he attends Pittwater High School. In addition to being a keen photographer, William is also a talented electric guitar player and artist. He is already planning to take his camera and guitar on a long road trip in Australia – just as soon as he gets his driving licence.



EQUIPMENT



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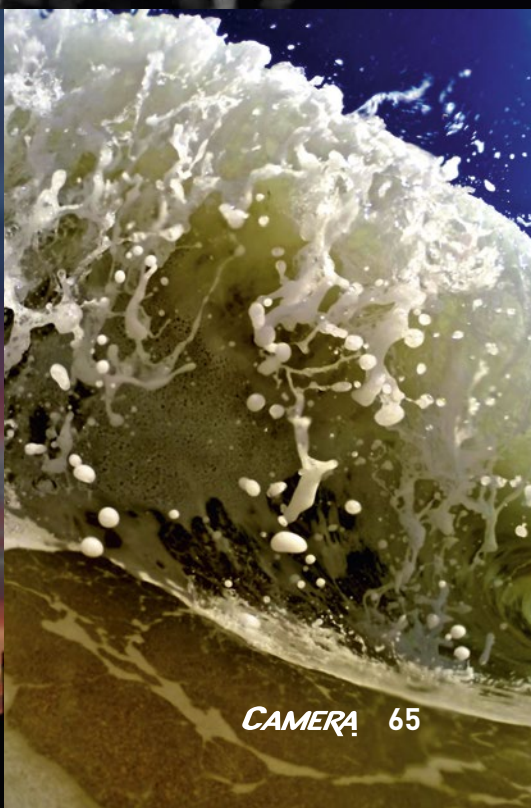


Canon
EOS 7D
Mark II
(borrowed)





All photographs by William Sides, copyright 2015.





TIPA PHOTO TROPHY 2015 WINNERS



1

TO CELEBRATE THE 175th anniversary of the invention of photography in 1839, TIPA organised a global photography competition open to all readers of its member magazines which includes *Camera*. The theme of the competition was *Discover The World – Open (Y)our Eyes To The Beauty Of Planet Earth*.

Now the judging has been completed and the winners announced and we're pleased to note that one of our readers, Glen Parker, was awarded a gold medal for his image, *Kiama Quarry*.

The €5000 first prize was won by Sergey Anisimov from Russia for an image called *Morning Of Iceland*. The second prize of €3000 was won by Canadian photographer Jonathan Tucker with his image, *Ice Cave*. The €2000 third prize went to José Ramos of Portugal for his image called *Colossus*.

The other gold medal winners were Marco Borne, Italy; Enrico Fossati, Italy; Carlos Fernández Turienzo, Spain; and Johannes Eßl, of Austria.

The TIPA Photo Trophy 2015 forms part of the Trierenberg Super Circuit & Special Themes Circuit 2015 which is the world's largest photo art contest, and has been running since 1992 (for more information visit www.supercircuit.at).

1. *Morning Of Iceland* by Sergey Anisimov, Russia. Winner first prize in the TIPA Photo Trophy 2015.

2. *Ice Cave* by Jonathan Tucker, Canada. Winner second prize in the TIPA Photo Trophy 2015.

3. *Colossus* by José Ramos, Portugal. Winner third prize in the TIPA Photo Trophy 2015.

2

3



1. Gueirua by Carlos Fernández Turienzo, Spain. Gold medal winner in the TIPA Photo Trophy 2015.

2. Ice Diving by Johannes Eßl, Austria. Gold medal winner in the TIPA Photo Trophy 2015.

3. Crimson Tower by Enrico Fossati, Italy. Gold medal winner in the TIPA Photo Trophy 2015.

4. Castil de Tierra by Marco Borne, Italy. Gold medal winner in the TIPA Photo Trophy 2015.

5. Kiama Quarry by Glen Parker, Australia. Gold medal winner in the TIPA Photo Trophy 2015.





AKADEMIE



FASCINATION WITH PHOTOGRAPHY

Leica Akademie continues its long tradition of photographic education through experiential workshops across Australian cities and abroad.

Headed by Principal Instructor Nick Rains, the Akademie's goal is to increase the fun and enjoyment of photography, expand photographic knowledge and bring the total Leica experience to a new generation of photographers. The Leica Akademie offers a wide range of workshops and photographic trips for photographers of all levels of ability. Leica ownership is not a pre-requisite, and we welcome you to bring your own camera along regardless of make or model. Whether you are an experienced photographer or you are just starting out, there is no better way to learn photography than the Leica Akademie.

New events for 2015 include:

- Back to Basics
- Lightroom
- Printing
- Street Photography
- Portraiture
- Rangefinder Photography
- Leica Akademie Photo Tour, Istanbul, 6-14 September 2015

To book your Leica Akademie workshop today, visit www.leica-akademie.com.au

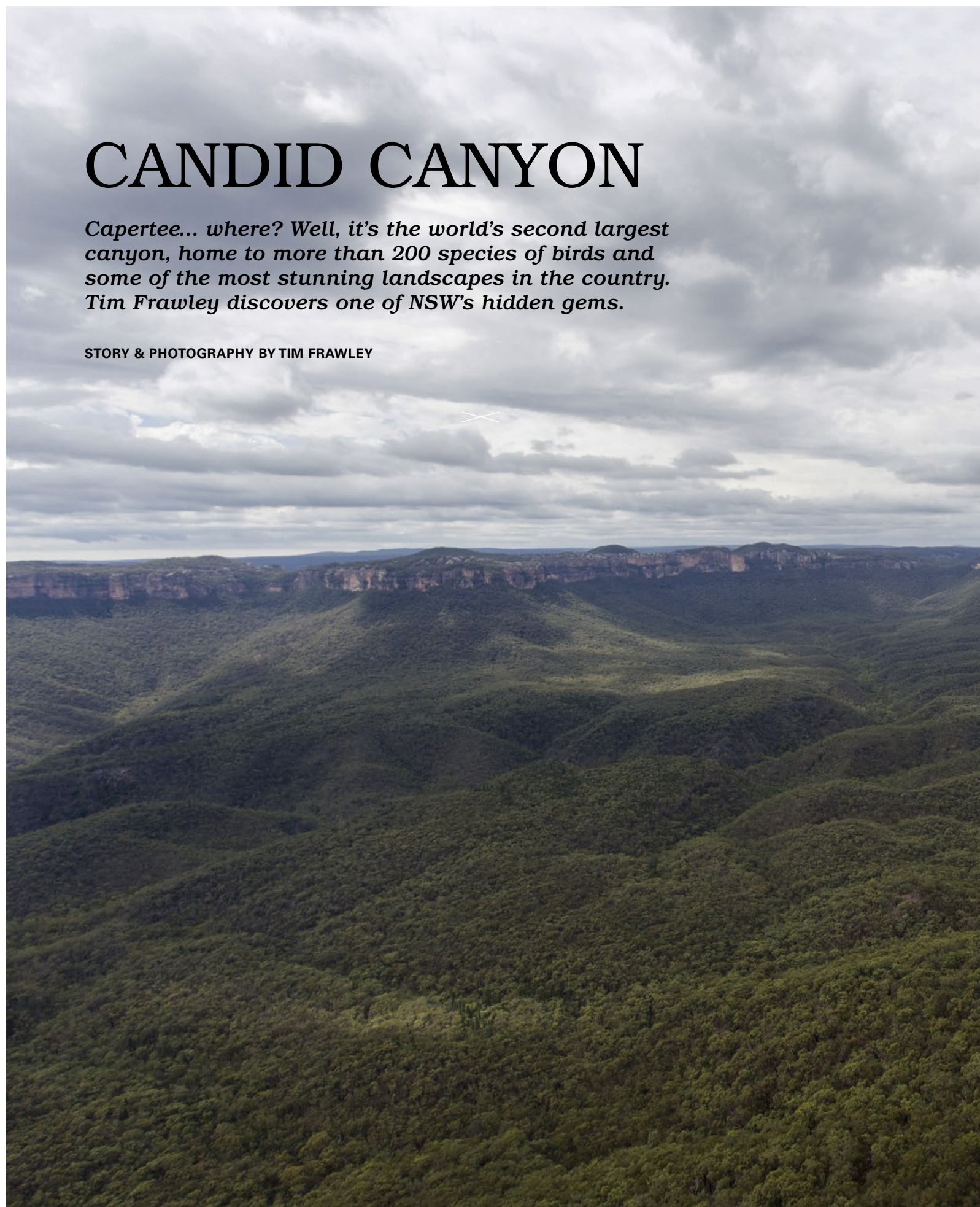


Principal Instructor
Nick Rains

CANDID CANYON

Capertee... where? Well, it's the world's second largest canyon, home to more than 200 species of birds and some of the most stunning landscapes in the country. Tim Frawley discovers one of NSW's hidden gems.

STORY & PHOTOGRAPHY BY TIM FRAWLEY





A Photographer's Guide
To The Capertee Valley, NSW

When I told people I was going to Capertee, their first reactions were all the same... "Where?" Then I told them that it's actually home to the world's second largest canyon.

Yep, Capertee Canyon – it even rolls off the tongue better than the only larger one, the USA's world-famous Grand Canyon. Capertee Valley is actually one kilometre longer than the Grand Canyon, but not quite as deep. Yet very few people have heard of it, even though Sydney is only around a three-hour drive away.

I wouldn't have heard of it either, but for a chance encounter in a tiny pub in the even less well-known town of Wallerawang. The owner, former rugby league player Barry 'Bowser' Rushworth, told me about Capertee Valley and claimed it was the second biggest valley in the world. I thought he may have had his facts muddled, but sure enough, after some checking, I found he was right. I just had to go and see this place for myself.

Around 45 kilometres north of the town of Lithgow (which is just west of the Blue Mountains), Capertee is surrounded by several World Heritage-listed national parks including Wollemi (with its famous pines), the Gardens of Stone and the Turon.

As well as being the widest canyon in the world, Capertee Valley is also home to around 236 species of birds (at last count), including several endangered species. This makes it one of the top 50 bird-watching areas in the world.

Even with these attractions, the village of Capertee, situated on the main road west to Mudgee, is still relatively tiny and sleepy. You can

tell not much has changed here over the years... there are just a few scattered houses, a pub, a petrol station and café, a small school and a police station. If you think it sounds a bit remote, that's because it is. Despite this though, there are many possibilities for the curious traveller to explore when checking out the area.

TAKE A WALK

For starters there are endless places to take a stroll, with fields and mountains as far as the eye can see, and scenery that varies from bush to cliffs to farmland. The Newnes Plateau, just a short drive south of Capertee village, is a great

“

As well as being widest canyon in the world, Capertee Valley is also home to around 236 species of birds (at last count), including several endangered species, which makes it one of the top 50 bird-watching areas in the world.”

place to spend the day hiking, with several tracks of varying difficulty. Even the drive out there will give you plenty of opportunities to get your camera out.

For the fit and adventurous, the Old Coach Road/Pagoda Track is a ten-kilometre round-trip hike. It isn't for the faint-hearted, but it will reward you with some amazing views of the valley, beautiful flora and, if you're lucky, you'll sight some rare birdlife as this walk takes you through some popular bird-watching areas.

If ten kilometres is a bit much (especially when carrying camera gear), then there are several other options. The glow worm tunnel is an eight-kilometre medium-grade hike which treats you to some lovely bush scenery, sunbaking reptiles and, of course, glow worms. And if you follow the road right to the end of Newnes, you'll discover several tracks that snake through the bush and run alongside a river, which makes for a nice, easy hike. Even though it's an easy walk, your eyes will still be rewarded as you stumble across old building ruins – the remnants of an old shale oil mine works being steadily reclaimed by nature, and a lovely, refreshing river which does a good job of cooling you down on a hot day, and also makes for a pleasing picture or two.

TAKE A BREAK

There's so much to do and see in the area that you'll need to recharge and take a break from all the adventuring. There's only one place (literally only one) to do that in Capertee village, and that's at the Capertee Royal Hotel.

A homage to Australia's pub culture in country towns, the Royal was built in the late 1800s and is a beautiful old stone building that's very photogenic. The hotel provides accommodation, delicious meals and friendly locals who are a wealth of information and love to share their wisdom and favourite places to visit.

One similarity with the drive to the Grand Canyon in the USA is that you'll find an old petrol station complete with antique pumps and some rusty iconic Australian cars that haven't been started in decades. It may not exactly be Old Route 66, but it still provides a nostalgic trip down memory lane, and is a great throwback to how Australia used to be.

TAKE A DRIVE

As with the variety of hikes, there are countless drives to follow around the area, each with its own particular photographic rewards – and if you have a 4WD, the possibilities are endless. However, no 4WD, no problem. I didn't have one and I was still spoilt for choice with photo opportunities.

Make your first stop Pearson's Lookout, just a few kilometres from Capertee village. Here you'll get a real feeling for the incredible span of the valley, with an amazing panoramic view across the floor to the opposite cliffs and the neighbouring national parks. If it's a clear night, venture back here (the later the better) and





PHOTOGENIC PLACES

you'll be awe-struck by a clear sky punctured by millions of stars.

Once you've had enough of the view, get back on the road and begin the Dunns/Capertee Discovery Trail, a 113-kilometre scenic drive which can easily be done in a 2WD vehicle. It showcases cliff-lined valleys, wildlife, classic bush scene, wide valleys, Glen Davis village and the Capertee Gorge and Dunns Swamp (a map can be downloaded from <http://tinyurl.com/omngc23>).

First stop on the drive is Glen Davis, which was once a thriving town at the centre of the oil-shale mining industry during the 1930-40s, but nowadays you can almost see the tumbleweeds blowing in the breeze down the empty streets. There's only a handful of people still living here, but plenty of empty or abandoned buildings. One disused shop has old bottles, jars and artefacts from the town's golden years that act as a window display. However, the magnificent art deco hotel – the most substantial building for miles around – has been restored.

The ruins of the Glen Davis oil-shale works are one of the main draws to the town. Every Saturday tours are run of the ruins and they are incredible. The remaining mine structures and nature have gone to war with each other over the years... and nature is the clear winner. Most of the old brick walls are now fallen, and trees are taking over those that are still standing... well, except for a massive section of the eight-storey retort banks (where the shale was heated to extract the oil), which looks as sturdy as the day it was built.

Peel your eyes away from the ruin long enough and you'll notice the huge cliff faces that surround the shale works and the whole of Glen Davis village. These are the main attraction of this location, and are particularly stunning at sunrise or sunset.

It's impossible not to be mesmerised by the beauty of the valley even before you have made it as far as Glen Davis, but the further you venture in, the more breathtaking it becomes.

TAKE A TENT

Next up, take the dirt road out to the Coorongooba campsite, and within minutes you'll encounter some more truly amazing scenery. Open grass fields – some with old brick chimneys still standing in them – soon give way to dense bush, and then the landscape finally opens up to a clearing and campsite where you're again surrounded by tall cliffs and, inevitably, some local wildlife.

If you don't need to leave in a hurry, you can always pitch a tent (it's a free campsite) and watch the sunset cast beautiful colours over the cliffs. If you don't have time to camp overnight, then get back on the road and head north towards Rylstone. The road to Rylstone will provide plenty of opportunities to stop and get your camera out – in fact, you'll be pulling over every few minutes to take pictures of rolling hills dotted with hay bales, grazing cows, collapsing old sheds and the odd rusted tractor or piece of farm equipment. Once you're in Rylstone you

won't be putting the camera away either, as this charming historic town has plenty of vintage shop fronts and reminders of its past glories.

The final stop, at Dunns Swamp, is far from what its name implies – it's a great place to spend the afternoon. As soon as you pull up to the camping area, you get a glimpse of the crystal clear river that swivels around the cliffs and disappears into the distance.

TAKE TO THE WATER

Grab a kayak and go for a paddle. It's easily the best way to get amongst the nature and the

beautiful surrounds of the Wollemi National Park. The vegetation of the surrounding areas varies from open woodland to dense bush to incredible pagoda-like rock formations.

The area is also rich in wildlife. Possums, kangaroos, tortoises, wombats and gliders are pretty common to see and, if you're lucky, you might even spot a platypus.

Networks of walking tracks surround the waterways and open up the possibility of capturing some truly incredible scenery. The majority of these walks are easy, but they will still provide you with plenty of great subjects. You can



The ruins of the Glen Davis oil-shale works are one of the main draws to the town. The remaining mine structures and nature have gone to war with each other over the years... and nature is the clear winner."



Storey retort banks still standing at Glen Davis are backed by cliff faces that become particularly photogenic at sunrise and sunset.

venture along the water's edge and get up close to some of the wildlife plus you're able to capture great views of the waterways themselves. One walk takes you to a location where the dramatic cliff-lines include original aboriginal rock-paintings.

Easily the most incredible view you'll get of the area is by scaling the pagoda-shaped rocks just off the Weir Walk. The rocks themselves are a sight to see, and stretch far and wide into the distance. As you climb higher and higher, the view becomes ever more impressive until you reach the top – and there you're treated to a truly expansive view. Below you can see the Capertee River snaking through the cliffs and off into the distance. Pagoda rocks surround you and then, off in the distance, are the ranges of the Nullo Mountain State Forest.

TAKE A FLIGHT

The locals told us there is really only one way to really appreciate just how big and amazing Capertee Valley really is, and that's by helicopter.

In a tiny village like Capertee, a helicopter is the last thing you expect to find, but just up

▼ Saturday tours are run of the old Glen Davis oil-shale works.

PHOTOGENIC PLACES





It's not quite Route 66, but ►
Capertee's old garage is a great
throwback to Australia's past.

BEING THERE

Do you have a favourite place in Australia for photography? We'd love to hear about it. We need between ten and 12 good quality images and around 1500 to 1200 words describing the region, the best spots for photography, how to get around and a few tips for visiting photographers (with regard to weather, seasonal changes, road conditions, available services, etc.).

So, if you fancy yourself as a travel writer, here's your chance (and, yes, you will get paid). Images can be in any form, either film or digital files, but the latter need to be of sufficient quality for magazine reproduction (i.e. at 300 dpi resolution and at least 15x20 cm in size). Please also remember to add the text file to the disc... a number of submissions have turned out to be pictures only.

Send your submission to Camera Magazine, Next Media Pty Ltd, Locked Bag 5555, St. Leonards, NSW 1590. If you want to discuss a possible location, send a brief outline via email to pburrows@nextmedia.com.au

SUBMISSIONS UPDATE

For readers interested in contributing to 'Photogenic Places', below is a list of the locations that have been covered by articles submitted, but not yet published. Check here to avoid doubling up. As a rough guide, we're now suggesting you concentrate on a smaller area rather than providing a regional overview, perhaps with a more detailed description of what's available to see and photograph.

- Fraser Island (Queensland)
- Mungo National Park (NSW)
- Lake Albert (Victoria)
- Murrindindi (Victoria)



the road from the hotel is Capertee Valley Helicopters, which runs amazing helicopter tours around the valley.

The locals didn't lie either, as getting high in the sky really is the only way to take in the sheer extent of the valley. The freedom of helicopter movement also allows you to get right alongside those monstrous cliffs. We fly over fields and farms, thick bush and scrub, then get up close to Mount Airlie, next passing over the stunning Gardens of Stone National Park, and back alongside more towering cliffs. Make sure

you ask for the doors to be taken off the helicopter as the unrestricted views then enable much better aerial photography. This experience proved to be truly incredible.

The Capertee Valley and surrounds provided visual treat after visual treat; I can't wait to go back. You can spend a few days here... or you could spend weeks, and still not run out of things to photograph.

I know that as I drove away, the stark landscapes and sheer beauty of the place left me wanting more. 🍷

2015 FUJIFILM SHOWCASE Fifth Round Winners



WINNER

You can almost hear the skirl of the bagpipes in this highly atmospheric study by regular entrant Greg Scanlon. This photograph was taken in Glen Etive in the Glencoe region of Scotland (the location of the final scene in the James Bond movie Skyfall

– Bond creator Ian Fleming once owned an estate nearby). The silhouetted peaks, thin ribbon of mist and the bend in the River Etive all combine to create a dramatic composition. Greg used a Pentax 645Z fitted with the Pentax D FA645 55mm prime lens.



FUJIFILM SHOWCASE

Tell us how you did it! When you enter the Fujifilm Showcase competition, remember to explain any tips and techniques you used to achieve the result. Also, let us know the type of camera and film.

1.TITLE	CAMERA	LENS
2.TITLE	CAMERA	LENS
3.TITLE	CAMERA	LENS
4.TITLE	CAMERA	LENS
NAME		
ADDRESS		
STATE	POSTCODE	TELEPHONE

☐ Please return entries. Self-addressed postage and packaging is included.

☐ I do not want my entries returned.

Should you be successful, please nominate your prize preference (tick the appropriate box)

Preferred memory card format:

☐ SecureDigital

☐ Film

Post your entry to: Fujifilm Showcase, Camera Magazine, Locked Bag 5555, St Leonards, NSW 1590



HIGHLY COMMENDED

The so-called 'rules' of photography are there to be broken, as Graham Scheer graphically illustrates with this shot of Henley Beach Jetty in South Australia. Shooting into the sun gives the sea a glassy, almost solid-looking quality and helps emphasise the cloud patterns, while the jetty's bisecting of the frame gives the composition a very strong balance. The obliging seagull in the foreground helps round everything off. Graham used a Pentax K5 D-SLR fitted with a Tamron 17-50mm zoom.



COMMENDED

Birds are always a challenging subject, but Suahs Kulkarni managed to capture this eastern Yellow Robin beautifully; ticking all the boxes for composition, exposure and focus. Suahs used a Nikon D7100 D-SLR fitted with a Tamron 200-500mm telephoto zoom.

ENTRY GUIDELINES FOR DIGITAL IMAGES

You can enter digital images into the Fujifilm Showcase and files can be supplied on CD via email or via our Website at www.avhub.com.au. The requirements for submitting digital files are as follows.

- 300 dpi resolution, and at a file size which enables a reproduction of up to 20x15 cm. Please avoid submitting overly large file sizes, especially when emailing the images. Up to 4.0 MB in file size is more than sufficient.
- Digital retouching and manipulation is permitted, but the judges will continue to reward good camera techniques.
- Full details of the camera, lens and any retouching must be supplied with the image. Images can be titled if you wish, but this isn't essential. Please make sure your CDs or DVDs are marked with your name and address.
- Up to four images may be permitted per entry.
- Please include an SAE if you would like your CD or DVD returned.
- Please stipulate which memory card format you require (see below).

Please indicate whether you would like a SecureDigital (SD) card or 35mm film.

DO YOU WANT TO WIN?

Fujifilm Australia generously supplies the prizes for each issue's successful entrants to the Showcase. Entrants have the choice of specifying either film or a memory card (please specify on the entry coupon or indicate your preference if entering via email). The grand prize is a Fujifilm FinePix S4200 digital camera (or the equivalent should it be replaced in the meantime) which has a 14 megapixels CCD sensor and a 30x optical zoom equivalent to 24-720mm.

Note that it is not a requirement that entries to the Fujifilm Showcase be taken on Fujifilm

camera equipment, either film or digital.

However, film-based photographs must be originally taken on Fujifilm products. In the case of winning images that are submitted as prints, proof may be required (i.e. by supplying the original negative).

FUJIFILM SHOWCASE 2015

The 2015 Fujifilm Showcase closes on 30 September 2015. Entries received after this date will be automatically entered in the 2016 competition which starts with the November/December 2015 issue. The overall winner of the 2015

competition will be announced in the same issue. You can enter the Fujifilm Showcase as many times as you like during the year, up to four photographs each time. Please make sure you provide all the necessary camera and film/capture details on the entry coupon (which can be copied if you don't want to cut up your magazine). All entries must be accompanied by a fully completed entry coupon.

Why not have a go? Not only can you win some great prizes, but it's also a chance to see one of your pictures in print. Read the accompanying rules carefully and get snapping.

DIGITAL SLR CAMERAS BUYER'S CHECK LIST JULY/AUGUST 2015

THIS CHECKLIST is designed to allow direct comparisons between different camera models, here listed in price order within each brand. The published prices are mostly supplied by the distributors as recommended retail prices (RRPs). However, some distributors are no longer supplying RRP's to the media so it has become necessary to determine an

'estimated street price' derived from the range of prices for a model published by retailers. Where this has been necessary, the letter 'E' appears at the start of the entry.

A dot appearing in a column indicates that the feature is available on the camera model listed. Where a specification or product detail hasn't yet been published

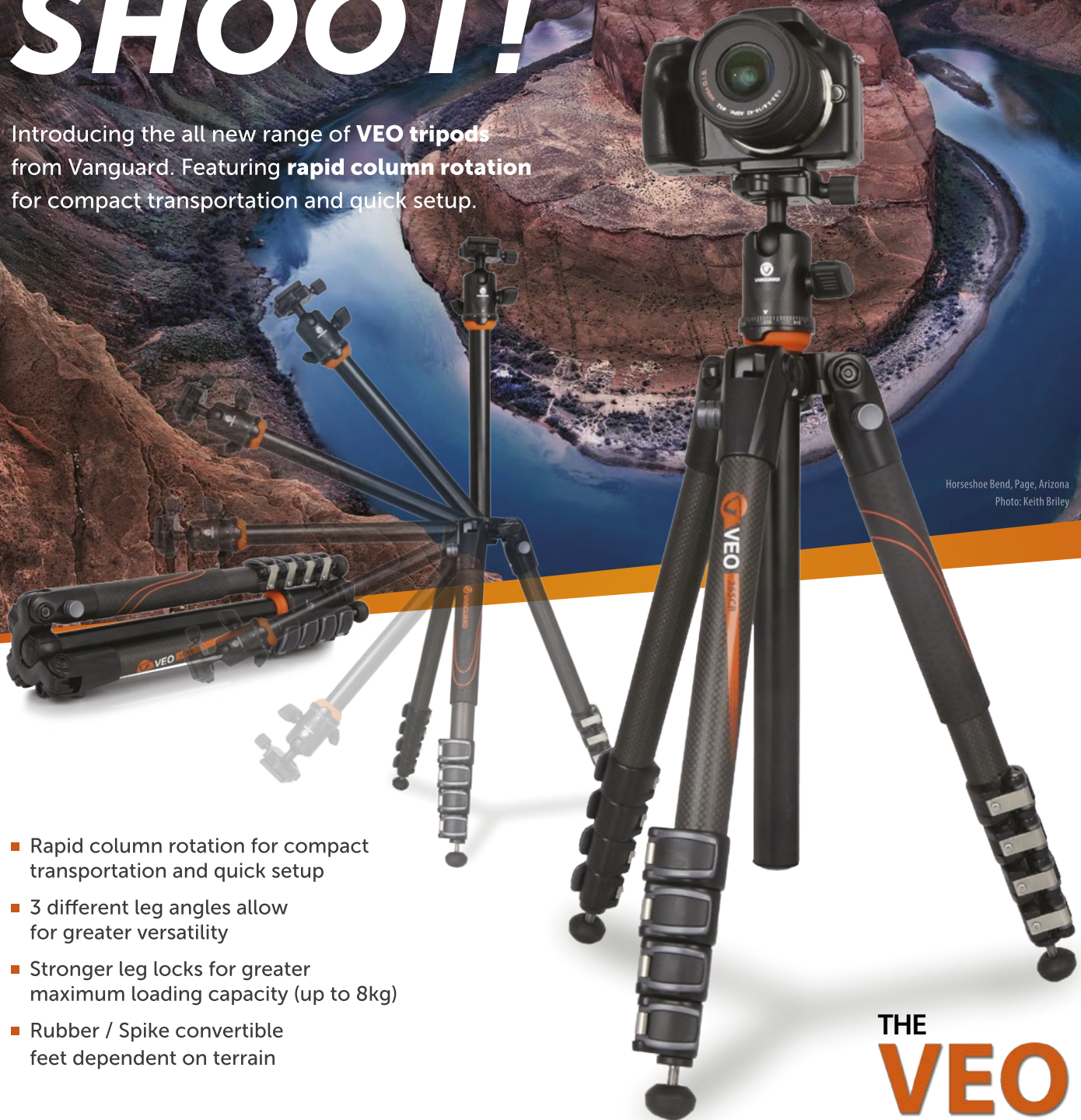
or confirmed, the letters TBA (to be announced) or TBC (to be confirmed) are used. If a feature is irrelevant to a particular model – such as mirror lock-up for compact system cameras – then n/a (not applicable) is used. Every effort is made to ensure accuracy; please send any corrections to camera@avhub.com.au

				Sensor Size	Sensor Type	File Formats	Memory Cards									Exposure Modes						Features										
	Model	Price (Body Only Unless Noted With Asterisk*)	Megapixels (Total)	35mm APS/DX	Four Thirds	CCD CMOS	Foveon RAW	TIFF	JPEG	Memory Stick Compact Flash	SD/SDH/CF/SDXC * = microSD	Continuous Shooting Speed (fps)	Burst Length (Unlimited) Max. Resolution	Autofocus Points	Metering Zones	Subject Programs	Aperture Priority	Shutter Priority	Manual	Shutter Speeds	Built-In Flash	Anti-Dust	HD Video	Mirror Lock-Up	Anti-Shake In Body	Wireless Transmitter/WiFi	Live View	Weather Proofing	Monitor Size (cm)	Weight (Body Only)	Review Issue	
E	Canon EOS 1200D	\$499	18.7	•	•	•	•	•	•		•	3	100	9	63	•	•	•	•	•	30-1/4000	•	•	•	•		•		7.62	450		
E	Canon EOS 600D*	\$649	19	•	•	•	•	•	•		•	3.7	u	9	63	•	•	•	•	•	30-1/4000	•	•	•	•		•		7.62	515	May/June '11	
E	Canon EOS 100D*	\$699	18.5	•	•	•	•	•	•		•	4	28	9	63	•	•	•	•	•	30-1/4000	•	•	•	•		•		7.7	370	Sept/Oct '13	
E	Canon EOS 700D*	\$749	18.5	•	•	•	•	•	•		•	5	22	9	63	•	•	•	•	•	30-1/4000	•	•	•	•		•	•	7.7	580	Jul/Aug '13	
E	Canon EOS 70D	\$1,349	20.9	•	•	•	•	•	•		•	7	40	19	63	•		•	•	•	30-1/8000	•	•	•	•		•	•	7.7	670	Nov/Dec '13	
E	Canon EOS 750D	\$1,349	24.7	•	•	•	•	•	•		•	5	440	19	7560	•		•	•	•	30-1/4000		•	•	•		•	•	7.7	555		
E	Canon EOS 760D	\$1,399	24.7	•	•	•	•	•	•		•	5	940	19	7560	•		•	•	•	30-1/4000		•	•	•		•	•	7.7	565		
E	Canon EOS 7D	\$1,799	19	•	•	•	•	•	•		•	8	90	19	63	•		•	•	•	30-1/8000	•	•	•	•		•	•	7.62	820	Jan/Feb '10	
E	Canon EOS 6D	\$2,299	20.6	•	•	•	•	•	•		•	4.5	1250	11	63	•		•	•	•	30-1/4000		•	•	•		•	•	7.62	690	Mar/Apr '13	
E	Canon EOS 7D Mark II	\$2,499	20.9	•	•	•	•	•	•		•	10	U	65	252	•		•	•	•	30-1/8000	•	•	•	•		•	•	7.7	910	Jan/Feb '15	
E	Canon EOS 5D Mark III	\$3,339	23.4	•	•	•	•	•	•		•	6	65	61	63	•		•	•	•	30-1/8000		•	•	•		•	•	8.1	860	May/June '12	
E	Canon EOS 5DS	\$4,999	53	•	•	•	•	•	•		•	5	510	61	105K	•		•	•	•	30-1/8000		•	•	•		•	•	8.7	845		
E	Canon EOS 5DSR	\$5,299	53	•	•	•	•	•	•		•	5	510	61	105K	•		•	•	•	30-1/8000		•	•	•		•	•	8.7	845		
E	Canon EOS-1DX	\$6,899	19.3	•	•	•	•	•	•		•	12	100	61	100K	•		•	•	•	30-1/8000		•	•	•		•	•	7.62	1340	Nov/Dec '12	
E	Nikon D3200*	\$549	16.9	•	•	•	•	•	•		•	4	100	11	420	•	•	•	•	•	30-1/4000	•	•	•	•	•	•		7.62	510	Jul/Aug '11	
E	Nikon D5100*	\$590	24.7	•	•	•	•	•	•		•	4	100	11	420	•	•	•	•	•	30-1/4000	•	•	•	•		•	•	8.1	510	Jul/Aug '13	
E	Nikon D3300*	\$649	24.7	•	•	•	•	•	•		•	5	TBA	11	420	•	•	•	•	•	30-1/4000	•	•	•	•		•		7.62	410		
E	Nikon D5200*	\$849	24.7	•	•	•	•	•	•		•	5	100	39	2016	•	•	•	•	•	30-1/4000	•	•	•	•		•	•	7.62	505	Jul/Aug '13	
E	Nikon D5300	\$949	24.7	•	•	•	•	•	•		•	5	100	39	2016	•	•	•	•	•	30-1/4000	•	•	•	•		•	•	8.1	480		
E	Nikon D5500*	\$1,049	24.7	•	•	•	•	•	•		•	5	100	39	2106	•	•	•	•	•	30-1/4000	•	•	•	•		•	•	8.1	420		
E	Nikon D7000*	\$1,099	16.9	•	•	•	•	•	•		•	6	100	39	2016	•	•	•	•	•	30-1/8000	•	•	•	•	•	•		7.62	690	Mar/Apr '11	
E	Nikon D7100*	\$1,299	24.7	•	•	•	•	•	•		•	6	33	51	2016	•	•	•	•	•	30-1/8000	•	•	•	•		•	•	8.1	675	Sept/Oct '13	
E	Nikon D7200	\$1,449	24.7	•	•	•	•	•	•		•	6	100	51	2016	•	•	•	•	•	30-1/8000	•	•	•	•		•	•	8.1	675	Jul/Aug '15	
E	Nikon D610	\$1,799	24.7	•	•	•	•	•	•		•	6	51	39	2016	•	•	•	•	•	30-1/8000	•	•	•	•		•	•	8.1	760	Mar/Apr '14	
E	Nikon D750	\$2,349	24.93	•	•	•	•	•	•		•	6.5	TBA	51	91K	•	•	•	•	•	30-1/4000	•	•	•	•		•	•	8.1	750	May/Jun '15	
E	Nikon Df	\$2,799	16.9	•	•	•	•	•	•		•	5.5	100	33	2016	•		•	•	•	30-1/4000		•	•			•	•	8.1	710	Mar/Apr '14	
E	Nikon D800	\$2,999	36.8	•	•	•	•	•	•		•	4	56	51	91K	•		•	•	•	30-1/8000	•	•	•	•		•	•	8.1	900	Sept/Oct '12	
E	Nikon D810	\$3,599	37.1	•	•	•	•	•	•		•	5	100	51	91K	•		•	•	•	30-1/8000	•	•	•	•		•	•	8.1	880	Sept/Oct '14	
E	Nikon D810A	\$3,899	37.1	•	•	•	•	•	•		•	5	U	51	91K	•		•	•	•	900-1/8000	•	•	•	•		•	•	8.1	880		
E	Nikon D4S	\$6,899	16.6	•	•	•	•	•	•		•	11	200	51	91K	•		•	•	•	30-1/8000		•	•	•		•	•	8.1	1180	Nov/Dec '14	
	Nikon D3X	\$9,199	25.7	•	•	•	•	•	•		•	5	130	51	1005	•		•	•	•	30-1/8000			•			•	•	7.62	1220	Mar/Apr '09	
	Pentax K-S1	\$749	20.42	•	•	•	•	•	•		•	5.4	20	11	77	•	•	•	•	•	30-1/6000	•	•	•	•	•	•		7.62	499		
	Pentax K-50*	\$899	16.5	•	•	•	•	•	•		•	6	30	11	77	•	•	•	•	•	30-1/6000	•	•	•	•	•	•	•	7.62	590	Mar/Apr '14	
	Pentax K-S2	\$925	20.42	•	•	•	•	•	•		•	5.5	30	11	77	•	•	•	•	•	30-1/6000	•	•	•	•	•	•	•	7.62	618		
	Pentax K-3*	\$1,599	24.7	•	•	•	•	•	•		•	8.3	60	27	86K	•		•	•	•	30-1/8000	•	•	•	•	•	•	•	7.62	715	Jul/Aug '14	
	Pentax K-3 II	\$1,349	24.7	•	•	•	•	•	•		•	8.3	60	27	86K	•		•	•	•	30-1/8000		•	•	•	•	•	•	8.1	700		
	Sony SLT-A58*	\$699	20.4	•	•	•	•	•	•		•	5	7	15	1200	•	•	•	•	•	30-1/4000	•	•	•	n/a	•		•	•	6.9	492	
	Sony SLT-A65*	\$1,099	24.7	•	•	•	•	•	•		•	8	13	15	1200	•	•	•	•	•	30-1/4000	•	•	•	n/a	•		•	7.62	622	May/June '12	
	Sony ILCA-77 II	\$1,499	24.7	•	•	•	•	•	•		•	12	60	79	1200	•	•	•	•	•	30-1/8000		•	•	n/a	•	•	•	7.62	647		
	Sony SLT-A99	\$2,999	24.7	•	•	•	•	•	•		•	6	15	19	1200	•	•	•	•	•	30-1/8000		•	•	n/a	•	•	•	7.62	733	Nov/Dec '12	

READY, SET, SHOOT!

NEW

Introducing the all new range of **VEO tripods** from Vanguard. Featuring **rapid column rotation** for compact transportation and quick setup.



Horseshoe Bend, Page, Arizona
Photo: Keith Briley

- Rapid column rotation for compact transportation and quick setup
- 3 different leg angles allow for greater versatility
- Stronger leg locks for greater maximum loading capacity (up to 8kg)
- Rubber / Spike convertible feet dependent on terrain

FROM **\$189.95**
MODEL SHOWN 265CB **\$379.95**

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VEO
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Now available from authorised Vanguard dealers.

 **VANGUARD**

COMPACT SYSTEM CAMERAS BUYER'S CHECK LIST JULY/AUGUST 2015

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or confirmed, the letters TBA (to be announced) or TBC (to be confirmed) are used. If a feature is irrelevant to a particular model – such as mirror lock-up for compact system cameras – then n/a (not applicable) is used. Every effort is made to ensure accuracy; please send any corrections to camera@avhub.com.au

			Sensor Size	Sensor Type	File Formats	Memory Cards									Exposure Modes				Features																
Model	Price (Body Only Unless Noted With Asterisk*)	Megapixels (Total)	35mm	APS/DX	Four Thirds	CCD	Foveon	RAW	TIFF	JPEG	Compact Flash	Memory Stick	SD/SDHC/SDXC - = microSD	Continuous Shooting Speed (fps)	Resolution	Burst Length (U=Unlimited) Max. Resolution	Autofocus Points	Metering Zones	Program	Subject Programs	Aperture Priority	Shutter Priority	Manual	Shutter Speeds	Built-In Flash	Anti-Dust	HD Video	Mirror Lock-Up	Anti-Shake In Body	Wireless Transmitter/WiFi	Live View	Weather Proofing	Monitor Size (cm)	Weight (Body Only)	Review Issue
E Canon EOS M3	\$799	24.7	•	•	•	•	•	•	•	•	•	•	•	4.2	1000	41	384	•	•	•	•	•	•	30-1/4000	•	•	•	n/a	•	•	•	7.5	350		
Fujifilm X-A2	\$699	16.5	•	•	•	•	•	•	•	•	•	•	•	6	18	49	256	•	•	•	•	•	•	30-1/4000	•	•	•	n/a	•	•	•	7.62	300		
Fujifilm X-A1*	\$849	16.3	•	•	•	•	•	•	•	•	•	•	•	5.6	30	49	256	•	•	•	•	•	•	30-1/4000	•	•	•	n/a	•	•	•	7.62	300		
Fujifilm X-T10*	\$1,299	16.7	•	•	•	•	•	•	•	•	•	•	•	8	8	49	256	•	•	•	•	•	•	30-1/4000	•	•	•	n/a	•	•	•	7.62	331		
Fujifilm X-M1*	\$1,099	16.3	•	•	•	•	•	•	•	•	•	•	•	5.6	30	49	256	•	•	•	•	•	•	30-1/4000	•	•	•	n/a	•	•	•	7.62	280	Nov/Dec '13	
Fujifilm X-T1	\$1,699	16.7	•	•	•	•	•	•	•	•	•	•	•	6	47	49	256	•	•	•	•	•	•	30-1/4000	•	•	•	n/a	•	•	•	7.62	390	May/June '14	
Fujifilm X-E2*	\$1,899	16.7	•	•	•	•	•	•	•	•	•	•	•	7	28	49	256	•	•	•	•	•	•	30-1/4000	•	•	•	n/a	•	•	•	7.62	300	Jan/Feb '14	
Fujifilm X-Pro1*	\$2,499	16.3	•	•	•	•	•	•	•	•	•	•	•	6	18	49	256	•	•	•	•	•	•	30-1/4000	•	•	•	n/a	•	•	•	7.62	400	May/June '12	
Hasselblad Lunar*	\$7,995	24.7	•	•	•	•	•	•	•	•	•	•	•	3	17	25	1200	•	•	•	•	•	•	30-1/4000	•	•	•	n/a	•	•	•	7.62	570		
Leica T	\$2,300	16.5	•	•	•	•	•	•	•	•	•	•	•	5	12	11	TBC	•	•	•	•	•	•	30-1/4000	•	•	•	n/a	•	•	•	9.4	339	Jul/Aug '14	
E Nikon S1*	\$499	12	15.9mm	•	•	•	•	•	•	•	•	•	•	15	15	135	TBC	•	•	•	•	•	•	30-1/16,000	•	•	•	n/a	•	•	•	7.62	197		
E Nikon J2*	\$549	12	15.9mm	•	•	•	•	•	•	•	•	•	•	10	22	135	TBC	•	•	•	•	•	•	30-1/16,000	•	•	•	n/a	•	•	•	7.62	238		
E Nikon J3*	\$599	15.1	15.9mm	•	•	•	•	•	•	•	•	•	•	15	22	135	TBC	•	•	•	•	•	•	30-1/16,000	•	•	•	n/a	•	•	•	7.62	201		
E Nikon J4*	\$699	18.4	15.9mm	•	•	•	•	•	•	•	•	•	•	20	20	171	TBC	•	•	•	•	•	•	30-1/16,000	•	•	•	n/a	•	•	•	7.62	192		
E Nikon J5*	\$749	23	15.9mm	•	•	•	•	•	•	•	•	•	•	20	20	171	TBC	•	•	•	•	•	•	30-1/16,000	•	•	•	n/a	•	•	•	7.62	231		
E Nikon AW1*	\$899	15.1	15.9mm	•	•	•	•	•	•	•	•	•	•	15	22	135	TBC	•	•	•	•	•	•	30-1/16,000	•	•	•	n/a	•	•	•	7.62	201		
E Nikon V3*	\$999	18.4	15.9mm	•	•	•	•	•	•	•	•	•	•	20	20	171	TBC	•	•	•	•	•	•	30-1/16,000	•	•	•	n/a	•	•	•	7.62	282	Sept/Oct '14	
Olympus E-PL5*	\$599	17.2	•	•	•	•	•	•	•	•	•	•	•	8	16	35	324	•	•	•	•	•	•	60-1/4000	•	•	•	n/a	•	•	•	7.62	279	Mar/Apr '13	
Olympus E-PL7*	\$799	17.2	•	•	•	•	•	•	•	•	•	•	•	8	36	81	324	•	•	•	•	•	•	60-1/4000	•	•	•	n/a	•	•	•	7.62	279		
Olympus E-P5*	\$899	17.9	•	•	•	•	•	•	•	•	•	•	•	9	17	35	324	•	•	•	•	•	•	60-1/4000	•	•	•	n/a	•	•	•	7.62	373		
Olympus OM-D E-M10*	\$999	17.2	•	•	•	•	•	•	•	•	•	•	•	8	70	81	324	•	•	•	•	•	•	60-1/4000	•	•	•	n/a	•	•	•	7.62	350	Jul/Aug '14	
Olympus OM-D E-M5 II*	\$1,299	17.2	•	•	•	•	•	•	•	•	•	•	•	10	19	81	324	•	•	•	•	•	•	60-1/16000	•	•	•	n/a	•	•	•	7.62	417	May/June '15	
Olympus OM-D E-M1*	\$1,599	17.2	•	•	•	•	•	•	•	•	•	•	•	10	49	81	324	•	•	•	•	•	•	60-1/8000	•	•	•	n/a	•	•	•	7.62	350	Nov/Dec '13	
Panasonic Lumix GF6*	\$699	16.7	•	•	•	•	•	•	•	•	•	•	•	4.2	u	23	1028	•	•	•	•	•	•	60-1/4000	•	•	•	n/a	•	•	•	7.62	340	Sept/Oct '13	
Panasonic Lumix GF7*	\$699	16.8	•	•	•	•	•	•	•	•	•	•	•	5.8	u	23	1728	•	•	•	•	•	•	60-1/16000	•	•	•	n/a	•	•	•	7.62	236		
Panasonic Lumix G6*	\$899	18.3	•	•	•	•	•	•	•	•	•	•	•	4.2	u	23	1728	•	•	•	•	•	•	60-1/4000	•	•	•	n/a	•	•	•	7.62	340	Sept/Oct '13	
Panasonic Lumix G7*	\$999	18.3	•	•	•	•	•	•	•	•	•	•	•	8	u	49	1728	•	•	•	•	•	•	60-1/16000	•	•	•	n/a	•	•	•	7.62	365		
Panasonic Lumix GM1*	\$999	16.8	•	•	•	•	•	•	•	•	•	•	•	4	u	23	1728	•	•	•	•	•	•	60-1/16000	•	•	•	n/a	•	•	•	7.62	204	May/June '14	
Panasonic Lumix GM5*	\$1,099	16.8	•	•	•	•	•	•	•	•	•	•	•	5.8	u	23	1728	•	•	•	•	•	•	60-1/16000	•	•	•	n/a	•	•	•	7.62	211	Mar/Apr '15	
Panasonic Lumix GX7*	\$1,299	16.8	•	•	•	•	•	•	•	•	•	•	•	7	u	23	1728	•	•	•	•	•	•	60-1/8000	•	•	•	n/a	•	•	•	7.62	340	Jan/Feb '14	
Panasonic Lumix GH3	\$1,299	17.2	•	•	•	•	•	•	•	•	•	•	•	6	u	23	144	•	•	•	•	•	•	60-1/4000	•	•	•	n/a	•	•	•	7.62	470	Jul/Aug '13	
Panasonic Lumix GH4	\$1,999	17.2	•	•	•	•	•	•	•	•	•	•	•	12	10	49	1728	•	•	•	•	•	•	60-1/8000	•	•	•	n/a	•	•	•	7.62	480	Jul/Aug '14	
Pentax Q-S1	\$449	12.7	9.5mm	•	•	•	•	•	•	•	•	•	•	5	5	25	1024	•	•	•	•	•	•	30-1/8000	•	•	•	n/a	•	•	•	7.62	183		
Pentax Q10*	\$497	12.7	9.7mm	•	•	•	•	•	•	•	•	•	•	5	5	25	16	•	•	•	•	•	•	30-1/2000	•	•	•	n/a	•	•	•	7.62	180		
Pentax Q*	\$599	12.7	7.5mm	•	•	•	•	•	•	•	•	•	•	5	5	25	1024	•	•	•	•	•	•	30-1/2000	•	•	•	n/a	•	•	•	7.62	180		
Pentax Q7*	\$699	12.7	9.5mm	•	•	•	•	•	•	•	•	•	•	5	5	25	16	•	•	•	•	•	•	30-1/2000	•	•	•	n/a	•	•	•	7.62	180	Jan/Feb '12	
Ricoh GXR + P10*	\$499	10.6	7.59mm	•	•	•	•	•	•	•	•	•	•	5	15	9	256	•	•	•	•	•	•	70-1/2000	•	n/a	•	n/a	•	•	•	7.62	367	Sept/Oct '10	
Ricoh GXR + S10*	\$649	10.4	9.5mm	•	•	•	•	•	•	•	•	•	•	1.6	15	9	256	•	•	•	•	•	•	180-1/2000	•	n/a	•	n/a	•	•	•	7.62	325	Mar/Apr '10	
Ricoh GXR + A12*	\$799	12.9	•	•	•	•	•	•	•	•	•	•	•	3	15	9	256	•	•	•	•	•	•	180-1/3200	•	n/a	•	n/a	•	•	•	7.62	160	Mar/Apr '10	
Ricoh GXR + A16*	\$899	16.5	•	•	•	•	•	•	•	•	•	•	•	2.5	14	9	256	•	•	•	•	•	•	180-1/3200	•	n/a	•	n/a	•	•	•	7.62	550	May/June '12	
Samsung NX Mini*	\$499	20.9	1-inch	•	•	•	•	•	•	•	•	•	•	6	10	21	221	•	•	•	•	•	•	30-1/16000	•	•	•	n/a	•	•	•	7.62	158		
Samsung NX3000*	\$599	21.6	•	•	•	•	•	•	•	•	•	•	•	5	10	21	221	•	•	•	•	•	•	30-1/4000	•	•	•	n/a	•	•	•	7.62	230		
Samsung NX500	\$999	30.7	•	•	•	•	•	•	•	•	•	•	•	9	40	205	221	•	•	•	•	•	•	30-1/16000	•	•	•	n/a	•	•	•	7.62	550		
Samsung NX30*	\$1,099	21.6	•	•	•																														



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